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THE PSYCHOLOGY OF LEARNING FROM DEMONSTRATION FILMS

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I

Improvements in the educational qualities of teaching films have not kept pace with scientific developments in photography, sound recording, and projection. When modern classroom films are compared with those produced twenty years ago technical advances are far more evident than new developments in the treatment of educational content. Some improvements in teaching qualities have been made, particularly in films produced by government agencies during the war. Yet on the whole there is a noticeable lag behind technical progress.

There are several reasons why this situation should exist. One is that more money and more high-powered scientific talent have been devoted to the technical improvement in films than to research on how pupils learn from films. Another reason is that most technical developments are refinements of original basic ideas. For example, Edison's kinetoscope embodied the fundamental principles which are now found in the most elaborate projectors. The notion of printing a succession of images on strips of celluloid is another basic idea in all motion pictures.

It may be argued, however, that it is unfair to compare the engineering progress based on principles of physics and chemistry with progress in the treatment of subject-matter based on psychology and artistic skill. One represents the more strictly scientific side of motion pictures while the other represents the artistic side. Certainly the content of entertainment films cannot be attributed to the elaboration of basic scientific principles. While it is true that teaching is an art and all great

teaching films are artistic creations, yet there is a certain body of scientific facts and theories that underly learning and teaching. The source of the difficulty may be that the principles of learning and teaching commonly found in the textbooks are not fundamental enough to provide an adequate foundation for the construction of better teaching films. Some producers of educational films have attempted to use such principles as Herbart's 'five steps' formulated one hundred years ago, or Thorndike's 'laws of learning' formulated more recently. But somehow these principles have not proved very useful guides in the production of good teaching films. One reason is that they are too broad and general and do not reveal the intricate nature of the learning machinery. A more scientific approach to the production of teaching films may be found by a better analysis of the complex process of learning, particularly of the types that occur when the learner is exposed to a motion picture.

As an illustration of how certain aspects of learning theory can be applied to the production of teaching films a preliminary analysis is here suggested of the psychology of learning from a demonstration. This analysis may be useful scientifically for further research and practically as a guide in the production and utilization of demonstration films.

II

Learning from a demonstration is a case of learning by 'delayed imitation.' The difference between delayed and 'immediate imitation' may be illustrated by two procedures used by the army for training soldiers to clean and oil their rifles. If, during the demonstration, each soldier has in his hand a rifle and imitates step by step the sequence of acts of the demonstrator, the learning that occurs would be an instance of immediate imitation. If, on the other hand, the soldier simply sits and watches the demonstrator to the end, then takes his rifle to try to do what the demonstrator did, this would be a case of delayed imitation.

The psychological principles involved in immediate imitation have been worked out in detail by Miller and Dollard.[1] They have shown that learning by imitation is not primarily an

[1] Miller and Dollard, *Social Learning and Imitation.* New Haven: Yale University Press, 1941.

instinctive process but is acquired by previous learning. Before a child can learn by imitation he must first learn to imitate. Learning to imitate breaks down into two major processes.

(1) The learner must acquire certain basic skills or learn to perform acts which may later be evoked by observing others perform them. For example, a two-year-old child who can not yet walk and run obviously can not tag along behind a four-year-old who can walk and run. A boy who is yet clumsy with tools can not imitate the highly coördinated finger skills of an expert watch repairman. Such unit skills may be acquired either by independent trial and error or under the guidance of a teacher who corrects errors and rewards successes. The process by which unit skills are acquired under the tutelage of a person who possesses them has been called 'copying' by Miller and Dollard.

(2) The second phase of imitative learning is called 'matched-dependent' behavior. After a child has learned to walk, talk, run, sing, and so on, he can then learn to run when he sees another child running or to sing when others are singing. These are instances of matched-dependent behavior. Here learning is largely a matter of discrimination—whom to imitate, when, and under what circumstances. In general it may be said that both children and animals will learn to imitate the behavior of leaders, teachers, or others in situations where matched-dependent behavior is found profitable. They will refrain from imitation or do the opposite when imitative behavior is punished or found unprofitable.

After an individual has acquired certain basic skills and has learned to copy the behavior of others in the use of these skills, he is then in a position to learn how to use his skills without the benefit of the presence of a leader or a demonstrator. Imitation is, therefore, a step in the process of becoming an independent learner. The process is complete when the learner can perform the act without the benefit of a demonstration. This requires that a correct sequence of responses be made to certain external cues or that verbal directions be formulated and recalled, or both.

As an illustration consider how a driver of an automobile learns to find his way through the streets of a city by following another car. As long as the leader car is in sight, all the driver has to do is to take his cues from that car. Later, however, he can find his way without the benefit of a guiding car only if he has noticed

certain stationary cues along the way such as traffic lights, peculiar buildings, advertising signs, trolley tracks, etc. But even if such cues are noted, they will not, until after considerable practice, evoke the correct responses automatically. For example, the driver may make a mental note of the fact that he must turn left at the first traffic light across the bridge, but unless he remembers the note he will not know what to do when he reaches this point. Hence memory enters as an important factor in guiding behavior.

Usually the memory factor is verbal. The driver remembers the words: "at the first traffic light across the bridge I turn to the left." When he crosses the bridge and sees the light these environmental stimuli remind him of the verbal directions. It is this verbal memory plus the external cues of the street intersection that evoke the response of turning the steering wheel to the left. However, after the driver has followed this route many times, memory of the verbal directions may no longer be necessary. He will turn to the left automatically when he comes to this corner.

III

Now we can trace roughly the psychology of the steps in learning to clean and oil a rifle. First, the soldier must possess the basic skills. He must be able to use a screw driver and the necessary tools, including the cleaning implements and the oil can. These are skills learned in other situations and transferred to this one. So during the demonstration the behavior of the soldier is matched to that of the demonstrator and is dependent on it. The unit acts of the demonstrator, such as removing screws, taking out parts, etc., are the cues which evoke matched responses from the soldier to his rifle. Then, knowing that he will be required to clean and oil his own gun without benefit of a demonstrator to guide him, the soldier, like the driver of the car, will look for cues that are independent of those provided by the demonstrator. Some of these may be found in the changed appearance of the gun after each operation; others will be the verbal directions which he formulates during the demonstration. He may also rely to some extent on verbal imagery, the feel of his tools, stresses and strains on muscles, all of which are component parts of a complex pattern of cues. In any event

the soldier can not perform the skill on his own until such a time as the pattern of cues present at the beginning of each step has acquired power to evoke the responses that are necessary for taking that step.

After the soldier has cleaned and oiled his gun successfully for a large number of times, he can get along on fewer cues. He may be able to do it with his eyes shut or his mind on something else. The reason is that the various components of the stimulus pattern have each acquired a sufficiently strong habit loading with the necessary responses to be able to evoke these responses without support of the habit loadings of other stimulus elements. Doing it with his eyes shut simply means that the visual components of the stimulus complex have been shut out.

IV

This analysis of learning by immediate imitation is preparatory to a further analysis of delayed imitation which is the type of learning required by most demonstration films. Learning is now somewhat harder than when the observer has in hand a sample of the model and imitates the demonstrator step by step. Such learning is really forging a chain of habits, cuing each successive step to its predecessor or to a string of guiding cues like verbal memory. Delayed imitation does not provide an opportunity to practice the sequence of responses to the sequence of stimuli. The most that the learner can do during the demonstration is to perform each step mentally or by slight imitative movements of his fingers and arms. Following the demonstrator mentally turns out upon analysis to be a complex process involving perceptual, imaginal, and verbal types of response.

Learning by observation of a demonstration is, therefore, a case of learning by doing. What the observer learns during the demonstration is what he actually does in response to it. If all that he does is to sit, look, and listen and enjoy the show, then that is precisely what he learns to do. If he becomes excited, angered, afraid, or bothered—and if these responses are reinforced, he learns to make emotional responses to the demonstration.

The types of responses that are most beneficial to him in learning to perform the skill himself are: grasping the meaning of the performance, trying to fix images of how the model looks in each step of the process, and, perhaps most important of all,

formulating silent verbal directions for the steps in the process. The observer may also derive some benefit of slight imitative movements of arms, hands, and legs which amount to an abbreviation of immediate imitation.

There are wide individual differences in the use made of imagery, feelings, and silent verbal directions in learning from a demonstration. Some persons have verbal imagery almost strong enough to take and retain a motion picture of the performance which is later run off mentally as a guide to the correct sequence of the acts. This ability, however, is rare. Most imagery is vague, scrappy, and unreliable—primarily because it suffers from the interference of images that are interposed between the time of viewing the demonstration and attempting to perform the skill. Other persons have excellent verbal capacities. During a demonstration they can formulate and remember adequate verbal descriptions of the demonstration to guide them in the skill. Persons with good verbal facility of this sort learn very rapidly from demonstrations. There is some experimental evidence to be cited in a moment which seems to indicate that self-formulated verbal directions are the most important responses that a learner can make during a demonstration.

V

The rôle of verbalization in learning from demonstrations was put to experimental test in a series of experiments on fifth-grade school children in New Haven, Connecticut, by Miss Louise Thompson.[1] By varying the methods of giving a demonstration she found that children learn fastest when they are encouraged and aided in making verbal discriminations between the parts of a model to be assembled and in formulating adequate and accurate verbal descriptions of the operations to be performed. Learning is slowest when the inner speech of the observer is broken up or hampered by requiring him to count orally from 0–100 by twos. Thompson actually used six methods of giving a demonstration. The first method was calculated to interfere as much as possible with inner verbalization by having the children count. The sixth method was designed to facilitate

[1] Thompson, Louise: *The Rôle of Verbalization in Learning from Demonstrations.* Unpublished dissertation, Yale University, 1944.

accurate and adequate verbalization. In between were four methods calculated to elicit from the children different amounts of verbalization during the demonstrations.

The tasks chosen for learning from a demonstration were those of assembling mechanical puzzles. Two puzzles were used—an easy one and a hard one. The easy one consisted of seven small pieces of cardboard cut into irregular triangles and rectangles which, when assembled in a certain way, would produce a model that represented a Chinese lamp. The hard puzzle was a three-dimensional cross made from six oblong blocks of wood approximately 2½″ long and ⅜″ thick. Five of the blocks were notched in the middle on one or two sides. The problem was to fit these notches together so as to form a three-dimensional cross which is firmly held in place by inserting the sixth block which is the key block. The easy puzzle was assembled in seven steps—one for each piece; and the hard puzzle in six steps.

The procedure was to take the children, one at a time, into a room off from the classroom. Care was exercised to be sure that none of the children had seen either of these puzzles before. Each method was used with a different group of twenty-five children. The groups were matched on intelligence tests and on a spatial arrangements test. They were of approximately the same age and grade—some were boys, some were girls. Each child was allowed a maximum of twenty-five trials for each puzzle (in a few instances this maximum was increased to thirty trials). The procedure was as follows: the demonstrater would arrange the pieces in a certain order, then assemble them, then dissemble them, then pass the pieces over to the child for the first trial. In the case of the easy puzzle the child was given thirty seconds; in the case of the hard puzzle, sixty seconds. If he failed within these time limits, the experimenter gave another demonstration. The time was limited in order to reduce the possibilities of trial-and-error learning. The results of this experiment are shown in Table I.

The children in this experiment already possessed the required unit manual skills of picking up blocks of wood and fitting them together. They also possessed certain unit verbal skills, but these were much less uniform and less well developed than the manual skills. Individual differences in the speeds of learning

among the children taught by the same method were correlated with their verbal abilities. The verbal deficiencies of slow learners were quite apparent from sound recordings of their efforts to formulate adequate descriptions of the assembly process when Methods 5 and 6 were used. In general the children who learned fastest were those best able to give an adequate account of how the puzzle was assembled.

TABLE I

During the demonstration		Easy puzzle		Hard puzzle	
Demonstrator assembles puzzles	Child	No. who learned it	Ave. No. trials	No. who learned it	Ave. No. trials
1. Silently	Counts to 100 by 2s	25	5.68	3	25+
2. Silently	Gave oral description of demonstrator's acts	25	3.12	22	22.00
3. With incomplete verbal descriptions	Silent	25	3.48	25	16.16
4. With complete verbal commentary	Silent	25	3.20	25	14.12
5. Silently—except for correcting the child's verbal errors	Same as (2) above except demonstrator corrected child's verbal errors	25	2.2	25	12.44
6. Same as (5) except each block had a number pasted on it. Blocks were assembled in numerical order		25	2.8	25	9.52

VI

We come now to the applications of the foregoing analysis to the planning and production of a demonstration film. Certain rules or guiding principles suggested by this analysis are the following:

1) In the analysis it was assumed throughout that the observers were adequately motivated to learn the skill. The psychology of motivation requires a complete analysis of its own as a guide to the development of motivational films or to the introduction of motivational sequences at the beginning of other types of films. In designing a demonstration film one may or may not wish to assume adequate motivation on the part of the observers. If not, the choice lies between attempting to build it into the film or relying on the teacher to provide it.

2) The performance to be filmed should be carefully analyzed and as far as possible simplified before the picture is planned. It may be necessary to call in a work simplification expert and get his advice on how useless motions can be eliminated and how necessary movements may be combined. The film should portray the job at its highest level of efficiency.

3) The designer of a demonstration film should have advance information on the basic skills of the prospective observers. For example, in designing a film on how to clean a rifle it may be safely assumed that every soldier already knows how to use a screw driver and already understands the English language well enough to follow the verbal commentary. In planning a film on watch-making it would probably not be safe to assume that the average run of the adult male population possesses the unit skills in the use of the precision tools that are required for watch repairing. The planner of the film must, therefore, begin by listing the basic skills that he assumes the observers to possess, and, second, he should make some effort to find out the extent to which these skills are actually possessed.

4) In the event that the demonstration requires basic skills which can not be assumed to exist among the observers or requires further development in them on the part of observers who have them to some degree, it is necessary to construct the film so that these particular unit skills will stand out clearly. This can be done in part by slow motion and in part by using the verbal commentary to emphasize techniques of acquiring these skills.

5) The demonstration to be filmed should be divided into a series of discrete steps or operational units. For example, one operational unit might be removing one screw; another might be removing all the screws that hold one particular part together. The size of these operational units would depend mainly upon the assumptions that the designer makes concerning the unit skills of the observers. Cleaning a gun, for example, may be regarded as one unit provided that the operations for cleaning all the different parts are essentially the same. In general it may be said that the number of operational units which the learner is required to remember should be an absolute minimum.

In filming the operations each step or unit would be marked off from the succeeding one by a pause, a fadeout, a statement by the commentator or some other device. In general, the tempo of the picture should be as slow as possible and yet hold the attention of the pupils. If the unit is rather long or fairly complex, some device for summarizing it or attempting to unify it should be introduced at its close.

6) Every part to be manipulated, every tool to be used should be, whenever possible, named, labelled, or numbered. In some instances the first part of the film might be devoted to drill, memorizing these names and labels. Learning the necessary discriminations by the use of labels pays big dividends in facilitating the learning to come later.

7) At each step in the process the model should appear on the screen from the angle that it will be viewed by the learner. The relation of the camera to the model should be the same as that of the eye of the student to it. This means that the picture should show only the hands and arms of the demonstrator. This is a special case of the more general principle that the learning situations should in so far as possible be identical with the life situations in which the skill is exercised.

8) Remembering that the observer is learning to make a sequence of verbal or imaginal responses to a sequence of visual cues provided by the changing appearance of the model, it is important that the significant cues should be featured by close-ups and by the verbal commentary. The commentary should be designed to guide the observer in formulating for himself an adequate set of verbal directions for performing the skill. Liberal use of question and answer may be made by the commentator. Such rhetorical questions as "What do we do next"

followed by an answer that calls attention to a cue that will suggest what to do next may be useful. In any event the commentary should use only words that the learners can understand. All technical words should be carefully defined.

9) A liberal pause between each sentence of the commentary will allow time for the observers to formulate their own verbal cues. Key sentences in the commentary may be repeated provided the pictorial sequence that matches it is long enough. Commentaries should suggest rewards for trying to formulate adequate descriptive sentences. The film and the commentary may demonstrate the dire consequences of making wrong responses at critical places. One way to facilitate results would be for the film to invite the observers to repeat orally the directions given by the commentator.

10) Since it is not likely that many students will learn to perform the entire skill by seeing one demonstration, and since showing the same film repeatedly is notoriously boring, it is recommended that the more difficult steps in the process be repeated perhaps two or three times in a film, but with certain variations. Repetition facilitates learning best when the essential elements in the solution are held as constant as possible from trial to trial and the non-essentials permitted to vary. This favors learning to discriminate the essentials from the non-essentials.

Persons who have had experience in planning and producing demonstrational films will no doubt recognize among these ten rules certain ones that have been carefully observed. Let it be repeated, however, that all of them are inferences drawn from the psychological analysis of learning from a demonstration. Their value depends not on whether they follow logically from learning theory, but on whether the observation of them results in pictures that give better results in the classroom.

VII

These suggestions for the planning and production of demonstration films have certain implications for utilization. The following may be noted briefly.

1) Before attempting to use any film—of any type—the teacher should know its contents as thoroughly as he knows any subject-matter that he is supposed to teach. For one thing, the teacher should make a list of the unit skills demanded by the film.

If any child is deficient in these skills, the defects should, if possible, be corrected before he is exposed to the film. The commentary should be analysed from the standpoint of the abilities of the pupils to comprehend fully its meaning.

2) Before the film is shown its purpose should be explained to the pupils and some 'hints' or pointers given as to how best to learn from it. Here the teacher should stress the importance of remembering the directions as to how the operations should be performed. Something may also be said about what to look for in the film, and what items, elements, or features may be ignored as irrelevant.

3) After the film has been run the teacher should immediately conduct a group discussion in which each member of the class is given an opportunity to rehearse verbally and orally the directions that he has learned. Errors and omissions will be corrected by the class and the teacher. Out of the discussion should emerge a fairly complete set of directions which are put on the board and copied by each pupil in a notebook. Diagrams and illustrations may be used freely, if needed.

4) These directions may be checked by running the picture a second time before the pupils try their hands at the skill.

5) Each pupil may now be given an opportunity to try his hand at the skill under the supervision of a teacher. From this point on, however, he is learning by trial-and-error, by instruction from his teacher, or by direct imitation of the teacher. In some instances it may be worth while to run the film a third and a fourth time. But unless the pupils want to see it for some special purpose, they will find it increasingly dull and boring.

Finally, it must be remembered that in the teaching of manual skills in industrial arts classes, vocational schools, shops, and factories, several methods are commonly employed. The basic method is trial-and-error with instructions and demonstrations given by the teacher. Here the film is definitely a teaching aid. No teacher would expect his students to acquire suddenly a complex skill from repeatedly viewing a filmed demonstration of it. The value of the film lies in the degree to which it supplements the demonstrational and instructional skills of the teacher. The demonstrational film is also an inexpensive and efficient means of acquainting the pupils with a wide variety of skills which they need not learn to perform. When used for this purpose, it serves as an instructional film.

PERSONALITY ADJUSTMENTS OF NINTH-GRADE PUPILS AS MEASURED BY THE MULTIPLE CHOICE RORSCHACH TEST AND THE CALIFORNIA TEST OF PERSONALITY

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One of the newest devices in the field of personality measurement is the Harrower-Erickson Multiple Choice Rorschach Test.[1] This instrument which contains three hundred items, utilizes the Rorschach cards or slides and can be administered to large numbers of individuals at one time. It is easy to give and easy to score. If it should prove to be a reliable and valid measure of significant aspects of personality, its value to schools and similar agencies would be great. At present, however, very little published research concerning this test has appeared.[2]

In the present study, three hundred eighty-two ninth-grade pupils in Quincy, Illinois, were administered both the Multiple Choice Rorschach Test and the California Test of Personality[3] and correlations and analyses were made of the results. The pupils were tested in groups of 75 to 100 during the first week of November, 1944. The recommended instructions for the administration of the two tests as given by their authors were carried out in every detail.

The purpose of this investigation was to see to what extent this new Rorschach test measures factors and traits which are

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[1] M. R. Harrower-Erickson and M. E. Steiner, *Large Scale Rorschach Techniques*, Charles C. Thomas, Springfield, Illinois, 1945, pp. 240–259.

[2] Up to the time of the writing of this article, the authors have been unable to discover any published research dealing with the 300-item Multiple Choice Rorschach Test. A few articles have appeared which report the use of a preliminary form of the Multiple Choice Rorschach Test, not now available, which contained one hundred items. These publications are listed in the bibliography at the end of this article.

[3] Copyright, 1942, by California Test Bureau, 5916 Hollywood Boulevard, Los Angeles, California.

purportedly measured by such an instrument as the California Test of Personality. Before presenting the results of this study, brief descriptions of the two tests used will be given.

Multiple Choice Rorschach Test.—The ten slides of the Rorschach inkblots[1] are projected upon a screen one at a time for three minutes each. During the first thirty seconds of this interval, the room is totally darkened; during the remaining two and one-half minutes enough light is introduced into the room to enable the subjects to record their answers on the test blanks. The inkblot, however, remains in full view during the entire three minutes. The total testing time required is thirty minutes. Before the first slide is projected upon the screen, each individual is provided with a record blank which contains the following instructions:

> You are going to see ten inkblot pictures one after another.
>
> Begin by taking a good look at Inkblot I and see if it, or any part of it, reminds you of anything or resembles something you have seen.
>
> Then read through each of the three groups of answers for Inkblot I (A, B, C).
>
> Now underline the one answer in Group A, the one answer in Group B, the one answer in Group C, which you think is the best description of that inkblot or any of its parts. You, therefore, underline three answers for Inkblot I.
>
> When you have done this, if you wish, you may put a check beside any other answer in any of the three groups which you also feel is a good description of the inkblot or any of its parts.
>
> Then do exactly the same thing for each of the other inkblots.

For each inkblot there are thirty answers or choices, ten under each group (A, B, C). Of these ten answers in each group, five are 'good' answers which have been taken from the

[1] The slides and record blanks used in this experiment were purchased from Dr. M. R. Harrower-Erickson, Department of Neuropsychiatry, University of Wisconsin, Madison, Wisconsin.

Rorschach[1] records of normal subjects, and five are 'poor' answers which have been taken from the records of abnormal subjects. Since the subject underlines the one best answer in each group, he underlines three answers for each inkblot and thirty for the entire test. The blank is scored by consulting a key. The subject's score is the number of 'poor' answers he has underlined.[2] On the Harrower-Erickson scoring key, it is suggested that "persons with over fifty per cent poor answers occurring in their first choices be screened out; that persons with between forty per cent and fifty per cent poor first answers be considered as borderline cases and where possible their poor answers evaluated in terms of Rorschach principles."

California Test of Personality.—The test used in this study was Form A of the Intermediate Series (Grades VII–X). This test provides scores not only for self-adjustment, social adjustment, and total adjustment, but also scores for six aspects of self-adjustment and six aspects of social adjustment. The parts of the test are shown in the outline on page 16.

The published reliability coefficients for the test based on seven hundred ninety-two cases (using the split-halves method corrected by the Spearman-Brown formula) are as follows: Total Adjustment, .932; Self-adjustment, .898; Social Adjustment, .873. The reliabilities of the twelve subtests are not given, but are said to be "sufficiently high to provide an aid in locating more restricted areas of personality difficulty."[3] Validity coefficients for the test are lacking, but it is stated that the items included in the test were selected on the basis of:

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[1] For a description of the regular Rorschach technique see S. J. Beck, *Rorschach's Test*, Grune and Stratton, New York, 1944, or B. Klopfer and D. M. Kelley, *The Rorschach Technique*, World Book Company, Yonkers-on-Hudson, New York, 1942.

[2] In scoring a blank it is also possible to determine the percentage of poor answers which occur among the subject's second choices (those checked but not underlined) and also the percentage of poor answers in the total record. Using the data of the present study (382 cases), the Pearson Product-Moment correlation was worked out between percentage of poor answers in first choices (underlined choices) and percentage of poor answers in the total record. It was found to be .92 ± .005. Because of this very high relationship, the authors have used the number of poor answers in first choices as representing each subject's score.

[3] *Manual of Directions*, California Test of Personality, Intermediate Series, California Test Bureau, Los Angeles, California, p. 4.

a) Judgments of teachers and principals regarding their relative validity and significance.

b) The reactions of students, expressing the extent to which they felt competent and willing to give correct responses.

c) A study of the extent to which student responses and teacher appraisals agreed.

d) A study of the relative significance of items by means of the bi-serial *r* technique.

In taking the test, the subject is instructed to answer 'yes' or 'no' to each of the one hundred eighty questions it contains.

	No. of items
1. Self-adjustment	90
A) Self-reliance	15
B) Sense of Personal Worth	15
C) Sense of Personal Freedom	15
D) Feeling of Belonging	15
E) Withdrawing Tendencies	15
F) Nervous Symptoms	15
2. Social Adjustment	90
A) Social Standards	15
B) Social Skills	15
C) Anti-social Tendencies	15
D) Family Relations	15
E) School Relations	15
F) Community Relations	15
Total Adjustment	180

The questions are similar to those found in most personality questionnaires. A sample question taken from the section on withdrawing tendencies is as follows:

Do you often feel lonesome even with people around you? Yes No

The time required to administer the test is approximately forty five minutes. A scoring key is provided which gives the list of 'desirable' responses. Percentile norms for all the sections and subsections based upon the scores made by children in grades VII to X are also given. The authors of the test state that "maladjustment in the various components is indicated

when the student's score is among the lower percentiles, or when the percentile graph tends to the left."[1]

RESULTS OF THE STUDY

The relationships which exist between maladjustment as measured by the Multiple Choice Rorschach Test and by the California Test of Personality are shown in Tables I, II, and III.

In Table I are given the Pearson Product-Moment correlations between number of 'poor' answers on the Multiple Choice Rorschach Test and number of 'undesirable' answers on the California Test of Personality and its two main divisions. These correlations (.22, .20, and .19, respectively), are very low, but are statistically significant as can be seen from the fact that the r in each case is approximately six to seven times as large as its probable error.

TABLE I.—RELATIONSHIP BETWEEN NUMBER OF 'POOR' ANSWERS ON THE MULTIPLE CHOICE RORSCHACH TEST AND NUMBER OF 'UNDESIRABLE' ANSWERS ON THE CALIFORNIA TEST OF PERSONALITY (N = 382)

	r (Pearson)	PE_r
Multiple Choice Rorschach and California Test of Personality (Total Adjustment).....	.22	.03
Multiple Choice Rorschach and California Test of Personality (Self-adjustment).....	.20	.03
Multiple Choice Rorschach and California Test of Personality (Social Adjustment).....	.19	.03

There were twenty-three pupils who underlined fifteen or more 'poor' answers on the Multiple Choice Rorschach Test. According to Harrower-Erickson, these are the individuals who should be suspected of being maladjusted and who should be screened out. These twenty-three pupils for the purpose of this study make up a so-called Maladjusted Rorschach Group. In Table II a comparison is made between the number of 'undesirable' answers this group gave to the California Test of Personality and the number of 'undesirable' answers given by the entire ninth-grade population. It is seen that the Maladjusted Rorschach Group did on the average make a higher number of

[1] *Ibid.*, p. 6.

'undesirable' responses to the California test than did the total group tested. The critical ratios are sufficiently high as to indicate that the obtained differences are fairly certain to be statistically significant.

TABLE II.—AVERAGE NUMBER OF 'UNDESIRABLE' RESPONSES ON THE CALIFORNIA TEST OF PERSONALITY MADE BY THE MALADJUSTED RORSCHACH GROUP (N = 23) AS COMPARED WITH THE TOTAL GROUP TESTED (N = 382)

	Self-adjustment	Social Adjustment	Total Adjustment
Maladjusted Rorschach Group.....	29.04	23.39	52.43
Total Group Tested.....	20.97	17.59	38.56
Critical Ratio.....	2.70	2.03	2.48

The average number of 'undesirable' answers on each of the twelve subdivisions of the California test made respectively by the Maladjusted Rorschach Group and the total group were also computed. Using these data and the standard deviations of the 'undesirable' scores made by the total group on the twelve subdivisions of the California test, it was possible to compute biserial correlations which represent the relationship which exists between maladjustment as measured by the Multiple Choice Rorschach Test and maladjustment as measured by each of the twelve components of the California test.[1] Biserial correlations were also computed between maladjustment as measured by the Multiple Choice Rorschach Test and maladjustment as measured by the total California test and its two main divisions. These fifteen biserial r's are shown in Table III. If the various components of the California test actually measure what they purport to measure, an inspection of these correlations should give some clue as to what aspects of personality maladjustment the Multiple Choice Rorschach Test does or does not measure.

Referring to Table III it is seen that six of the twelve components of the California test are correlated in a statistically significant manner with maladjustment as measured by the Multiple Choice Rorschach Test (the r in each case being at

[1] See E. F. Lindquist, *Statistical Analysis in Educational Research*, Houghton Mifflin Company, Boston, 1940, pp. 241–243, for the method used in computing the biserial correlations.

least four times its probable error). These six components are: Sense of Personal Worth, Sense of Personal Freedom, Feeling of Belonging, Withdrawing Tendencies, Family Relations, and School Relations. Almost reaching statistical significance is the relationship between Anti-social Tendencies and 'poor' scores on the Multiple Choice Rorschach Test. The other factors

TABLE III.—RELATIONSHIP BETWEEN MALADJUSTMENT AS MEASURED BY THE MULTIPLE CHOICE RORSCHACH TEST AND MALADJUSTMENT AS MEASURED BY THE TWELVE SUBDIVISIONS, THE TWO MAIN DIVISIONS, AND THE TOTAL SCORE ON THE CALIFORNIA TEST OF PERSONALITY

	r_{bis}	PE_r
Rorschach and 1A (Self-reliance)	.10	.068
Rorschach and 1B (Sense of Personal Worth)	.37	.064
Rorschach and 1C (Sense of Personal Freedom)	.27	.066
Rorschach and 1D (Feeling of Belonging)	.33	.065
Rorschach and 1E (Withdrawing Tendencies)	.29	.066
Rorschach and 1F (Nervous Symptoms)	.12	.068
Rorschach and 2A (Social Standards)	.11	.068
Rorschach and 2B (Social Skills)	.14	.068
Rorschach and 2C (Anti-social Tendencies)	.22	.067
Rorschach and 2D (Family Relations)	.26	.066
Rorschach and 2E (School Relations)	.35	.065
Rorschach and 2F (Community Relations)	.05	.069
Rorschach and Total Self-adjustment	.34	.065
Rorschach and Total Social Adjustment	.26	.066
Rorschach and Total Adjustment	.32	.065

of the California test—Self-reliance, Nervous Symptoms, Social Standards, Social Skills, and Community Relations—are very slightly measured if at all by the Multiple Choice Rorschach Test. The scores on Total Adjustment and the two main categories, Self-adjustment and Social Adjustment, are also seen to be significantly related to maladjustment on this new version of the Rorschach Test. This fact can also be observed in Table I. The biserial correlations, however, are somewhat higher than are the Pearson Product-Moment correlations of Table I.

It is interesting to note (See Table III) that the Multiple Choice Rorschach Test correlates more highly with some of the twelve components of the California test than it does with the entire test. There is also some evidence that the Multiple Choice Rorschach Test is a better measure of Self-adjustment than it is of Social Adjustment. This difference, however, is slight and may not be statistically significant.

Probably the most important observation to be made from this investigation, however, is the fact that none of the relationships between scores on the Multiple Choice Rorschach Test and scores on the California test can be termed even reasonably high. The two tests evidently measure only to a very slight extent the same aspects of personality. Many pupils in school who would be rated maladjusted on one of the tests would obviously not be so rated on the other test. From the data of this investigation it is impossible to say which of these two tests gives the more valid measure of personality maladjustment. Perhaps one of the tests possesses a high degree of validity and the other does not, or perhaps neither does. It would seem that schools and other agencies using either of these tests in the guidance of individuals should not take the results too seriously until additional evidence with respect to its validity has been secured.

BIBLIOGRAPHY

Harrower-Erickson, M. R., "A Multiple Choice Test for Screening Purposes," *Psychosomatic Medicine*, Vol. 5, No. 4, October, 1943, pp. 331–341.

Harrower-Erickson, M. R., and Steiner, M. E., *Large Scale Rorschach Techniques*, Charles C. Thomas, Springfield, Illinois, 1945, pp. 151–259.

Jensen, M. B., and Rotter, J. B., "The Validity of the Multiple Choice Rorschach Test in Officer Candidate Selection," *Psychological Bulletin*, Vol. 42, No. 3, March, 1945, pp. 182–185.

Wittson, C. L., Hunt, W. A., and Older, H. J., "The Use of the Multiple Choice Rorschach Test in Military Screening," *Journal of Psychology*, Vol. 17, 1944, pp. 91–94.

THE EFFECT OF BILINGUALISM UPON THE MEASUREMENT OF THE INTELLIGENCE OF CHILDREN OF PRESCHOOL AGE*

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Bilingualism, as a subject for scientific investigation, is heavily weighted with psychological and educational implications. The increasing number of studies which have been reported in psychological and educational journals within the past twenty-five years constitute evidence for the belief that a scientific interest in bilingualism and its effects is growing rapidly. An analysis of the results of these investigations warrants the conclusions that bilingualism is not uniform as to kind and that the influence of bilingualism upon individuals of different races and in different environments is one that cannot be predicted without the presentation of a far greater amount of evidence than that which has been offered to date.

The recognition of bilingualism as an important psychological and educational problem has been concurrent with the widespread use of standardized tests of intelligence and achievement both in the psychological clinic and in the classroom. This is understandable, since these standardized tests have provided the educator interested in the problem of bilingualism, with an objective means of determining whether or not intellectual differences exist between the bilingual and the monolingual child. The difficulties inherent in preschool testing, however, have accounted for a great dearth in studies concerned with the effect of bilingualism upon the mental development of the preschool child, and it was in an attempt to contribute the results of controlled experimentation with respect to the problem at this particular age level that the present investigation was undertaken.

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THE PROBLEM

The problem in the present investigation was to determine the effect of bilingualism upon performance on verbal and non-verbal tests of intelligence. The investigator sought, by means of controlled experimentation, to answer the following questions:

1) What is the effect of bilingualism upon the measured intelligence of children of preschool age?

2) To what extent can a reliable non-verbal test of intelligence, such as the *Atkins Object-fitting Test*, be employed as a substitute for a widely-used verbal test of intelligence, such as the 1937 *Revision of the Stanford-Binet Scale*?

3) Are reliable sex differences found when the intelligence of bilingual and monolingual preschool children is measured by means of the *Stanford-Binet Scale* and the *Atkins Test*.

THE SUBJECTS

The subjects of the investigation were two hundred twelve children between the ages of two years, six months and four years, five months. Of this number, one hundred twenty-seven subjects were selected from the children attending ten nursery schools in the boroughs of Brooklyn and Manhattan in New York City and eighty-five subjects were selected from the siblings of children who, at the time of selection, were attending Public School Number 97 in the borough of Brooklyn.

Of the two hundred twelve subjects who were chosen for experimentation, one hundred six were selected for the monolingual group and one hundred six were classified as bilinguists. A rating scale was used to determine whether or not a child qualified for the monolingual or bilingual groups. The information relating to language was obtained by means of an informal interview with each child's mother. The information concerning the other items on the rating scale was procured from the files in the case of nursery-school children, and from the mother of each subject in the case of the siblings of the children in Public School Number 97.

If the answers to the questions on this rating scale indicated that the child heard and spoke Italian at home always or most of the time, whereas he heard and spoke English outside the

home always or most of the time, he met the requirements for the bilingual group, as far as the language factor was concerned. If, on the other hand, the child heard and spoke only English at home, spoke only English outside the home, and heard English outside the home always or almost always, he met the requirements for the monolingual group as far as the language factor was concerned.

Both the monolingual and the bilingual groups were divided into four age levels, each covering six months of chronological age. At each age level, the monolingual and bilingual groups were matched as to number so that at the youngest age level there were twenty-two monoglots and twenty-two bilinguists whereas at each of the other three levels, there were twenty-eight monoglots and twenty-eight bilinguists. There was also an equal number of males and females in both the monolingual and the bilingual groups at each of the four age levels.

In addition to matching the members of the two language groups with respect to age, number, and sex, there was a person-for-person matching between the subjects in both the monolingual and bilingual groups with regard to socio-economic status as determined by paternal occupations. *The Goodenough Revision of the Barr-Taussig Scale* was used to classify the occupations of the fathers. The factors of age, sex, number, and socio-economic status were held constant in order to control the variables which would be most likely to influence the intelligence test results.

THE INTELLIGENCE SCALES EMPLOYED

Two individual intelligence scales were administered to each child who was selected for this study. *The* 1937 *Revision of the Stanford Binet Scale, Form L,* was used as the verbal test and the *Atkins Object-fitting Test, Form A,* was used as the non-verbal means of measurement. In measuring the subjects of this investigation by means of verbal and non-verbal intelligence tests, the investigator assumed that if the performance of the bilingual subjects on the verbal test of intelligence reflected a handicap because of the language factor, the individuals so handicapped would make higher scores on the non-verbal test. Conversely, if a significant difference were not found to exist between the scores of the bilinguists on the verbal and non-verbal

scales, it might be concluded that bilingualism is not to be considered as a handicap when measuring the performance of bilingual subjects on verbal tests of intelligence.

METHOD OF INVESTIGATION

Having matched the bilingual and monolingual groups as to number, sex, socio-economic status, and age within six months' intervals, the verbal and non-verbal intelligence scales were administered. Not more than thirty-six hours elapsed between the administration of the two scales to the same child and the order of administration varied systematically so that any possible effect which the order of administration might have on the test results would be cancelled. This was accomplished by administering the *Stanford-Binet Scale* and the *Atkins Test*, in that order, to half the number of male subjects and half the number of female subjects at each age level in both the monolingual and bilingual groups, and by reversing the order of administration of the tests for the remaining half of each age and language group. In all cases the subjects who had been matched as to sex and socio-economic status were also matched as to the order of test administration.

Preschool testing requires a special technique. Every effort was expended to make each child who was tested physically comfortable. A low table and two children's chairs were used for all testing and no child was tested when hungry or in need of a nap. When testing the nursery-school subjects, the examiner and child were alone in the room in which the testing took place except when the child gave evidence of excessive timidity. In the case of extremely timid children, the person who was in charge of the nursery group was asked to be present but to take no part in the testing. In the case of the children who were tested in Public School Number 97, the mother of the child remained in the room but did not participate in the administration of the test. Cases of extreme negativism—twelve in all—were excluded from the investigation.

ANALYSIS OF RESULTS

When a comparison was made between the mean IQ's achieved on the *Stanford-Binet Scale* by the monolingual and bilingual

groups, divided according to sex, the following results were found: The mean IQ of the fifty-three monolingual boys on the *Stanford-Binet Scale* was 98.77 with a standard deviation of 11.71, whereas the mean IQ of the fifty-three bilingual boys was 90.12 with a standard deviation of 11.77. The difference in mean IQ's of 8.65, in favor of the monolingual boys, was found to be statistically significant, since the critical ratio technique, when applied, yielded a ratio of 3.79. A comparison of the mean IQ's of the monolingual and the bilingual girls revealed that the fifty-three monolingual girls achieved a mean IQ of 98.61 with a standard deviation of 11.30 whereas the fifty-three bilingual girls achieved a mean IQ of 91.59 with a standard deviation of 11.28. The difference of 7.02 between the mean IQ's, which was in favor of the monolingual girls, was found to be statistically significant, since the critical ratio was found to be 3.21.

When the two language groups were divided according to sex and their mean IQ's were compared on the *Atkins Object-fitting Test*, it was found that the mean IQ for the fifty-three monolingual boys was 89.21 with a standard deviation of 13.70, whereas the mean IQ of the fifty-three bilingual boys was 97.90 with a standard deviation of 15.18. The obtained difference in mean IQ's of 8.69 in favor of the bilingual boys, was found to be statistically significant, since the critical ratio was found to be 3.10. The mean IQ of the fifty-three monolingual girls on the *Atkins Test* was 88.71 with a standard deviation of 12.71, whereas the mean IQ of the fifty-three bilingual girls on this scale was 96.90 with a standard deviation of 15.50. The obtained difference in mean IQ's was found to be 8.19, in favor of the bilingual girls, and the critical ratio technique, when applied, yielded a ratio of 2.98 which, while not indicative of a significant difference of virtual certainty, may, for all practical purposes, be considered as indicative of a significant difference, since there are 99.9 chances in 100 that the true difference is greater than zero.

In order to determine whether or not there was any significant difference between the performance of the two sexes on the *Stanford-Binet Scale* and the *Atkins Test*, respectively, the differences between the mean IQ's of the boys and girls of both groups on each of these scales were sought. With respect to the performances on the *Stanford-Binet Scale*, it was found that the

monolingual boys achieved a mean IQ of 98.77 with a standard deviation of 11.71, whereas the monolingual girls achieved a mean IQ of 98.61 with a standard deviation of 11.30. The obtained difference in mean IQ's of .16, in favor of the monolingual boys, is decidedly insignificant since the critical ratio was found to be only .07. Similar results were found when the difference between the mean IQ's of the bilingual boys and bilingual girls on the *Stanford-Binet Scale* was determined. The bilingual boys achieved a mean IQ of 90.12 with a standard deviation of 11.77, while the bilingual girls achieved a mean IQ of 91.59 with a standard deviation of 11.28. The obtained difference between the mean IQ's was 1.47 in favor of the bilingual girls. This difference is insignificant since the ratio of the difference to the standard error of the difference was found to be only .66.

The comparison of the mean IQ's of the two sexes on the *Atkins Test* yielded results similar to those found with respect to the comparison of the mean IQ's of the two sexes on the *Stanford-Binet Scale.* The mean IQ of the monolingual boys on the *Atkins Test* was 89.21 with a standard deviation of 13.70, while the mean IQ of the monolingual girls was 88.71 with a standard deviation of 12.71. The obtained difference in mean IQ's of .50, in favor of the monolingual boys, was found to be statistically insignificant since the ratio of the difference to the standard error of the difference was only .20. When the mean IQ's of the bilingual boys and bilingual girls on the *Atkins Test* were compared, it was found that the bilingual boys achieved a mean IQ of 97.90 with a standard deviation of 15.18, whereas the bilingual girls achieved a mean IQ of 96.90 with a standard deviation of 15.50. The difference in the mean IQ's of the two groups was 1.00 in favor of the bilingual boys and the critical ratio was found to be .34, which indicated that the obtained difference is decidedly insignificant.

Since no significant sex differences were found between the mean IQ's of the girls and boys in each language group on the *Stanford-Binet Scale* or on the *Atkins Test,* the IQ's of the girls and boys in each language group were combined and the differences between the mean IQ's of the one hundred six monoglots and the one hundred six bilinguists on the *Stanford-Binet Scale* and on the *Atkins Test,* respectively, were determined. The

mean IQ of the one hundred six monoglots on the *Stanford-Binet Scale* was 98.69 with a standard deviation of 11.47, while the mean IQ of the one hundred six bilinguists was 90.85 with a standard deviation of 11.37. The difference between the mean IQ's of the two groups was 7.84 in favor of the monoglots and the ratio of the difference to the standard error of the difference was 5.00. Therefore, the obtained difference, in favor of the monoglots, on the *Stanford-Binet Scale* may be considered as statistically significant.

When the mean IQ's achieved by the one hundred monoglots and the one hundred six bilinguists on the *Atkins Test* were compared, it was found that the monoglots achieved a mean IQ of 88.95 with a standard deviation of 13.17, whereas the bilinguists achieved a mean IQ of 97.50 with a standard deviation of 15.30. The obtained difference in mean IQ's was 8.55 in favor of the bilinguists and the critical ratio was found to be 4.36. Therefore, it may be concluded that the difference between the mean IQ's of the monoglots and the bilinguists on the *Atkins Test*, which was in favor of the bilinguists, is a significant one since the critical ratio was found to be greater than three.

A comparison of the mean IQ's of the monolingual and the bilingual groups, divided according to age and sex, on the *Stanford-Binet Scale* and on the *Atkins Test*, respectively, showed that there was a consistent trend in each age and sex group for the mean IQ's of the monoglots to surpass the mean IQ's of the bilinguists on the *Stanford-Binet Scale* whereas on the *Atkins Test* the mean IQ's of the bilinguists surpassed the mean IQ's of the monoglots. Tables I and II give a detailed presentation of these data.

The differences between the mean mental ages on the *Stanford-Binet Scale* for the monolingual and the bilingual groups, divided according to sex, were determined. It was found that the mean mental age of the fifty-three monolingual boys was 42.02 months with a standard deviation of 8.27 as against a mean mental age for the bilingual boys of 38.26 months with a standard deviation of 7.80. The difference in mean mental ages of 3.76 months, in favor of the monolingual boys, is statistically significant since the critical ratio was found to be 3.05. When the mean mental ages of the monolingual girls and the bilingual girls on the *Stanford-Binet Scale* were compared, it was found that the mean mental

TABLE I.—MEAN IQ'S ON THE STANFORD-BINET SCALE FOR THE MONOGLOTS AND BILINGUISTS DIVIDED ACCORDING TO AGE AND SEX

Age groups	Monoglots							
	Boys				Girls			
	No.	Mean IQ	SD	σ^M	No.	Mean IQ	SD	σ^M
2 yrs. 6 mos. 2 yrs. 11 mos....	11	98.4	13.55	4.29	11	94.2	10.81	3.42
3 yrs. 0 mos. 3 yrs. 5 mos.....	14	100.4	9.70	2.69	14	100.5	13.32	3.69
3 yrs. 6 mos. 3 yrs. 11 mos....	14	100	13.84	3.83	14	101.4	10.11	2.80
4 yrs. 0 mos. 4 yrs. 5 mos.....	14	96.9	9.51	2.63	14	97.4	8.81	2.44

Age groups	Bilinguists							
	Boys				Girls			
	No.	Mean IQ	SD	σ^M	No.	Mean IQ	SD	σ^M
2 yrs. 6 mos. 2 yrs. 11 mos....	11	91.4	11.27	3.57	11	90.8	7.73	2.45
3 yrs. 0 mos. 3 yrs. 5 mos.....	14	88.4	8.77	2.43	14	98.1	6.64	1.87
3 yrs. 6 mos. 3 yrs. 11 mos....	14	92.8	10.89	3.01	14	86.6	14.86	4.12
4 yrs. 0 mos. 4 yrs. 5 mos.....	14	88.1	13.54	3.75	14	91.5	9.74	2.70

TABLE II.—MEAN IQ'S ON THE ATKINS TEST FOR THE MONOGLOTS AND BILINGUISTS DIVIDED ACCORDING TO AGE AND SEX

Age groups	Monoglots							
	Boys				Girls			
	No.	Mean IQ	SD	σ^M	No.	Mean IQ	SD	σ^M
2 yrs. 6 mos. 2 yrs. 11 mos....	11	89.8	10.28	3.25	11	90.5	12.12	3.84
3 yrs. 0 mos. 3 yrs. 5 mos.....	14	90.4	14.72	4.08	14	92.6	14.24	3.95
3 yrs. 6 mos. 3 yrs. 11 mos....	14	87.5	16.67	4.62	14	88.6	11.67	3.23
4 yrs. 0 mos. 4 yrs. 5 mos.....	14	89.2	11.40	3.15	14	84.2	10.74	2.98

Age groups	Bilinguists							
	Boys				Girls			
	No.	Mean IQ	SD	σ^M	No.	Mean IQ	SD	σ^M
2 yrs. 6 mos. 2 yrs. 11 mos....	11	104.9	14.69	4.65	11	101.9	11.30	3.58
3 yrs. 0 mos. 3 yrs. 5 mos.....	14	94.1	9.97	2.77	14	101.5	15.49	4.29
3 yrs. 6 mos. 3 yrs. 11 mos....	14	95.7	15.92	4.41	14	89.2	16.23	4.50
4 yrs. 0 mos. 4 yrs. 5 mos.....	14	96.8	17.70	4.90	14	95.4	14.54	4.03

age of the monolingual girls was 41.55 months with a standard deviation of 7.97, while the mean mental age of the bilingual girls was 38.58 months with a standard deviation of 7.90. The obtained difference between the mean mental ages of the two groups was 2.97 months in favor of the monolingual girls and the ratio of the difference to the standard error of the difference was 1.93. Since the critical ratio is less than three, the obtained difference cannot be considered as statistically significant. However, it approaches significance since the chances are ninety-seven in one hundred that the true difference is greater than zero.

When the differences in mental ages on the *Atkins Test* for the monolingual and bilingual boys were determined, it was found that the monolingual boys achieved a mean mental age of 37.85 months with a standard deviation of 8.47, whereas the bilingual boys achieved a mean mental age of 41.45 months with a standard deviation of 9.18. The obtained difference in mean mental ages between the two groups was 3.60 months and the ratio of the difference to the standard error of the difference was found to be 2.11. This ratio indicates that the obtained difference is not statistically significant but approaches statistical significance, since the chances are ninety-eight in one hundred that the true difference is greater than zero. The mean mental age of the monolingual girls on the *Atkins Test* was 37.61 months with a standard deviation of 7.46, while the mean mental age of the bilingual girls was 41.15 months with a standard deviation of 8.79. The obtained difference in mean mental ages for the two groups was 3.54 months in favor of the bilingual girls and the critical ratio was found to be 2.24. While this critical ratio is not indicative of a significant difference, it does indicate that the obtained difference approaches significance since the chances are ninety-nine in one hundred that the true difference is greater than zero.

An analysis of the differences between the performances of the boys and girls of each language group with respect to the mean mental ages achieved on the *Stanford-Binet Scale* and the *Atkins Test* followed the same trend as the results which were found when the two sex groups were compared with respect to mean IQ's. No significant sex differences were found since the difference between the mean mental ages of the monolingual boys and

monolingual girls on the *Standord-Binet Scale* was only .47 months, in favor of the monolingual boys. A critical ratio of .30 indicated that this difference is statistically insignificant. The differences between the mean mental ages of the bilingual boys and bilingual girls on the *Stanford-Binet Scale* was found to be .32 months, in favor of the bilingual girls, and the critical ratio of .21 indicated that the obtained difference is decidedly insignificant.

On the *Atkins Test* the difference between the mean mental ages of the monolingual boys and the monolingual girls was .24 months in favor of the monolingual boys, and the critical ratio of .16 indicated that the obtained difference is statistically insignificant. When the mean mental ages of the bilingual boys and bilingual girls were compared on the *Atkins Test*, it was found that the difference between the mean mental ages of the two groups was .30 months in favor of the bilingual boys and the critical ratio of .17 indicates that this obtained difference is decidedly insignificant.

Since the differences between the boys and girls of each language group with respect to mean mental ages on the *Stanford-Binet* and *Atkins Test* were found to be statistically insignificant, the mental ages of the girls and boys of each language group were combined and the differences between the mean mental ages of the one hundred six monoglots and one hundred six bilinguists on each intelligence scale were determined. The mean mental age of the one hundred six monoglots on the *Stanford-Binet Scale* was 41.78 months with a standard deviation of 8.27, whereas the mean mental age of the one hundred six bilinguists was 38.72 months with a standard deviation of 7.86. The obtained difference in mean mental ages between the two language groups was 3.06 months in favor of the monoglots and the critical ratio was found to be 2.78. While this critical ratio is less than three, and therefore not indicative of a virtually significant difference, the obtained difference definitely approaches significance since there are 99.74 chances in 100 that the true difference is greater than zero.

When the mean mental ages of the one hundred six monoglots and the one hundred six bilinguists on the *Atkins Test* were compared, it was found that the mean mental age of the mono-

glots was 37.73 months with a standard deviation of 7.98, whereas the mean mental age of the bilinguists was 41.30 months with a standard deviation of 8.99. The obtained difference between the mean mental ages of the two groups was 3.57 months in favor of the bilinguists and the critical ratio was found to be 3.08 which indicates that the obtained difference is a significant one. It may, therefore, be concluded that the performance of the bilinguists on the *Atkins Test* was superior to that of the monoglots.

The mean mental ages on the *Stanford-Binet Scale* and the *Atkins Test* for the two language groups, divided according to age and sex, were determined and it was found that there was a consistent trend for the mean mental ages of the monoglots to exceed the mean mental ages of the bilinguists on the *Stanford-Binet Scale*, whereas on the *Atkins Test* the mean mental ages of the bilinguists exceeded the mean mental ages of the monoglots. Tables III and IV present the data on these differences.

In order to determine whether or not the *Atkins Test* might be used as a substitute for the *Stanford-Binet Scale* when testing the intelligence of bilingual children, the Pearson coefficients of correlation were found between the IQ's on the two scales for the monoglots and bilinguists divided according to age and sex. The coefficients of correlation ranged from .40 to .78 and, while they tend to be lower in the youngest age group, there was no definite trend for the coefficients of correlation to differ with age. When all the age groups in each language group were combined, it was found that the coefficient of correlation between the IQ's of the fifty-three monolingual boys on the *Stanford-Binet Scale* and *Atkins Test* was .63 with a PE*r* of .05, whereas the coefficient of correlation between the IQ's on the two scales for the monolingual girls was .61 with a PE*r* of .06. The coefficient of correlation between the IQ's of the bilingual boys on the two scales was .63 with a PE*r* of .05 and the coefficient of correlation between the IQ's on the two scales for the bilingual girls was .59 with a PE*r* of .06. When the sexes were combined, it was found that the coefficient of correlation between the IQ's on the two scales for the one hundred six monoglots was .62 with a PE*r* of .04, whereas the coefficient of correlation between the IQ's on the two scales for the one hundred six bilinguists

TABLE III.—MEAN MENTAL AGES ON THE STANFORD-BINET SCALE FOR THE MONOGLOTS AND BILINGUISTS DIVIDED ACCORDING TO AGE AND SEX

Age groups	Monoglots							
	Boys				Girls			
	No.	Mean MA	SD	σ^M	No.	Mean MA	SD	σ^M
2 yrs. 6 mos. 2 yrs. 11 mos....	11	31.64	4.71	1.49	11	30.64	3.81	1.21
3 yrs. 0 mos. 3 yrs. 5 mos.....	14	39.50	4.21	1.17	14	38.86	5.55	1.53
3 yrs. 6 mos. 3 yrs. 11 mos....	14	44.79	5.97	1.65	14	45.57	4.40	1.22
4 yrs. 0 mos. 4 yrs. 5 mos.....	14	49.93	5.13	1.42	14	48.79	4.83	1.34

Age groups	Bilinguists							
	Boys				Girls			
	No.	Mean MA	SD	σ^M	No.	Mean MA	SD	σ^M
2 yrs. 6 mos. 2 yrs. 11 mos....	11	29.81	10.78	3.41	11	29.18	3.53	1.12
3 yrs. 0 mos. 3 yrs. 5 mos.....	14	35.07	4.46	1.24	14	38.14	3.37	.93
3 yrs. 6 mos. 3 yrs. 11 mos....	14	41.00	4.85	1.34	14	38.93	7.51	2.08
4 yrs. 0 mos. 4 yrs. 5 mos.....	14	45.36	7.27	2.01	14	46.07	5.59	1.55

TABLE IV.—MEAN MENTAL AGES ON THE ATKINS SCALE FOR THE MONOGLOTS AND BILINGUISTS DIVIDED ACCORDING TO AGE AND SEX

Age groups	Monoglots							
	Boys				Girls			
	No.	Mean MA	SD	σ^M	No.	Mean MA	SD	σ^M
2 yrs. 6 mos. 2 yrs. 11 mos....	11	28.72	10.54	3.34	11	29.27	10.99	3.48
3 yrs. 0 mos. 3 yrs. 5 mos.....	14	35.79	6.88	1.91	14	35.71	5.59	1.55
3 yrs. 6 mos. 3 yrs. 11 mos....	14	39.21	7.53	2.09	14	39.79	5.07	1.40
4 yrs. 0 mos. 4 yrs. 5 mos.....	14	45.71	5.17	1.43	14	43.86	6.30	1.75

Age groups	Bilinguists							
	Boys				Girls			
	No.	Mean MA	SD	σ^M	No.	Mean MA	SD	σ^M
2 yrs. 6 mos. 2 yrs. 11 mos....	11	35.27	4.94	1.56	11	32.91	4.83	1.53
3 yrs. 0 mos. 3 yrs. 5 mos.....	14	36.36	4.70	1.30	14	39.57	6.78	1.89
3 yrs. 6 mos. 3 yrs. 11 mos....	14	42.50	6.10	1.69	14	42.36	6.51	1.80
4 yrs. 0 mos. 4 yrs. 5 mos.....	14	50.36	10.15	2.81	14	48.00	9.16	2.49

was .61 with a PE*r* of .04. It may be concluded, therefore, that while these coefficients of correlation were not high enough to warrant the substitution of the *Atkins Test* for the *Stanford-Binet Scale*, the correlation coefficients between the IQ's achieved on the two scales for both the one hundred six monoglots and the one hundred six bilinguists are more than fifteen times their

TABLE V.—PEARSON COEFFICIENTS OF CORRELATION BETWEEN THE STANFORD-BINET IQ'S AND THE ATKINS IQ'S FOR AGE, SEX, AND LANGUAGE GROUPS

Age groups	Monoglots						Bilinguists					
	No.	Boys		No.	Girls		No.	Boys		No.	Girls	
		*,SB-A	PE*r*		,SB-A	PE*r*		,SB-A	PE*r*		,SB-A	PE*r*
2 yrs. 6 mos. 2 yrs 11 mos.	11	.55		11	.58		11	.40		11	.57	
3 yrs. 0 mos. 3 yrs. 5 mos.	14	.70		14	.76		14	.58		14	.51	
3 yrs. 6 mos. 3 yrs. 11 mos.	14	.73		14	.50		14	.68		14	.49	
4 yrs. 0 mos. 4 yrs. 5 mos.	14	.53		14	.59		14	.69		14	.74	
Combined age groups: 2 yrs. 6 mos. 4 yrs. 5 mos.	53	.63	.05	53	.61	.06	53	.63	.05	53	.59	.06
Combined age and sex groups: 2 yrs. 6 mos. 4 yrs. 5 mos.	106	*r* = .62		PE*r* = .04			106	*r* = .61		PE*r* = .04		

* ,SB-A = Coefficient of correlation between Stanford-Binet and Atkins I.Q.'s.

respective PE's and these coefficients of correlation may, therefore, be accepted as reliable. It is evident that the two scales are measuring the same functions to a large extent, but certain factors which are measured by one scale are not measured by the other. The small difference of .01 between the coefficients of correlation of the monoglots and of the bilinguists on the two

scales is a further indication of the fact that the differences found between the mean IQ's and mean mental ages of the two language groups on these scales was undoubtedly due to the language handicap which proved detrimental to the performance of the bilingual subjects on the *Stanford-Binet Scale* but was compensated for by their superior performance on the *Atkins Test*. Therefore, the coefficients of correlation between the IQ's of the monolingual groups and the bilingual groups respectively on the two intelligence scales were practically equalized. Table V presents the correlation data of this investigation.

Since the coefficients of correlation between the mean IQ's on the *Stanford-Binet Scale* and the *Atkins Test*, when determined separately for the two language groups, were found to be reliable, it was decided to find the difference between the mean IQ's on the two scales for the monoglots and the bilinguists divided according to sex. The difference between the mean IQ's on the two scales for the monolingual boys was 9.56 in favor of the mean IQ achieved on the *Stanford-Binet Scale* and the critical ratio was found to be 6.28, which indicates that this difference is statistically significant. The difference between the mean IQ's of the monolingual girls on the *Stanford-Binet Scale* and the *Atkins Test* was 9.90 in favor of the mean IQ achieved on the *Stanford-Binet Scale* and the critical ratio, which was found to be 6.83, indicates that this difference is a significant one.

The difference between the mean IQ's on the *Stanford-Binet Scale* and the *Atkins Test* for the bilingual boys was found to be 7.78 in favor of the mean IQ achieved on the *Atkins Test*, and the critical ratio of 4.75 which was found indicates that this difference is significant. The difference in mean IQ's on the two scales for the bilingual girls was 5.31 in favor of the mean IQ achieved on the *Atkins Test*, and the critical ratio of 3.03 indicates that this difference is statistically significant.

When the IQ's of the boys and girls in each language group were combined and the differences between the mean IQ's on the *Stanford-Binet Scale* and the *Atkins Test* were sought, it was found that the difference between the mean IQ's of the one hundred six monoglots on the *Stanford-Binet Scale* and on the *Atkins Test* was 9.74 in favor of the mean IQ achieved by the monoglots on the *Stanford-Binet Scale* and the critical ratio of

9.28 indicates that this difference is statistically significant. On the other hand, when the mean IQ's of the one hundred six bilinguists on the *Stanford-Binet Scale* and on the *Atkins Test* were compared, it was found that the difference between the mean IQ's achieved by this group on the two scales was 6.65 in favor of the mean IQ achieved on the *Atkins Test*, and the critical ratio of 5.54 which was found indicates that this difference is statistically significant. Table VI presents these data.

TABLE VI.—DIFFERENCES BETWEEN THE MEAN IQ'S ON THE STANFORD-BINET SCALE AND THE ATKINS TEST FOR THE MONOGLOTS AND THE BILINGUISTS

Scales administered	Monoglots		Bilinguists	
	Stanford-Binet	Atkins	Stanford-Binet	Atkins
Number of Subjects	106	106	106	106
Mean IQ	98.69	88.95	90.85	97.50
Standard Deviation	11.47	13.17	11.37	15.30
Standard Error of the Mean	1.11	1.28	1.10	1.49
r between Stanford-Binet and Atkins	.62		.61	
Difference between Means	9.74		6.65	
Standard Error of the Difference	1.05		1.20	
Critical Ratio	9.28		5.54	

CONCLUSIONS

The results of this investigation warrant the drawing of the following conclusions with respect to the particular population which was studied:

1) The performance of the monolingual boys surpassed that of the bilingual boys with respect to the mean IQ's achieved on the *Stanford-Binet Scale.* The critical ratio of 3.79 indicated

that the difference in mean IQ's between the two groups was statistically significant.

2) The performance of the monolingual girls surpassed that of the bilingual girls on the *Stanford-Binet Scale.* The critical ratio of 3.21 indicated that the difference in mean IQ's between the two groups was statistically significant.

3) The performance of the bilingual boys surpassed that of the monolingual boys on the *Atkins Object-fitting Test.* The critical ratio of 3.10 indicated that the difference between the mean IQ's of the two groups was statistically significant.

4) The performance of the bilingual girls surpassed that of the monolingual girls on the *Atkins Test.* The critical ratio of 2.98, while not indicative of a significant difference of virtual certainty, may for all practical purposes be accepted as indicative of the fact that the difference between the mean IQ's of the two groups was significant, since there are 99.9 chances in 100 that the true difference is greater than zero.

5) Decidedly insignificant differences were found between the performances of the monolingual boys and the monolingual girls and the performances of the bilingual boys and bilingual girls both on the *Stanford-Binet Scale* and on the *Atkins Test.*

6) When the sexes were combined, the performance of the one hundred six monoglots surpassed that of the one hundred six bilinguists on the *Stanford-Binet Scale.* The critical ratio of 5.00 indicated that the difference between the mean IQ's of the two groups was statistically significant.

7) The performance of the one hundred six bilinguists surpassed that of the one hundred six monoglots on the *Atkins Test.* The critical ratio of 4.36 indicated that the difference between the mean IQ's of the two groups was statistically significant.

8) The performance of the one hundred six monoglots surpassed that of the one hundred six bilinguists with respect to mean mental ages achieved on the *Stanford-Binet Scale.* The critical ratio of 2.78, while not indicative of a significant difference, does indicate that the difference in mean mental ages between the two groups definitely approached significance since

the chances are 99.74 in 100 that the true difference is greater than zero.

9) The performance of the one hundred six bilinguists surpassed that of the one hundred six monoglots with respect to mean mental ages achieved on the *Atkins Test.* The critical ratio of 3.08 indicated that the difference between the mean mental ages of the two groups was significant.

10) The Pearson coefficients of correlation between the IQ's achieved on the *Stanford-Binet Scale* and on the *Atkins Test* by the two language groups, divided according to age and sex, were too low to warrant the substituting of one scale for the other in clinical or educational practice. The correlation coefficients ranged from .40 to .78.

11) The Pearson coefficients of correlation between the IQ's achieved on the *Stanford-Binet Scale* and on the *Atkins Test* by the two language groups when all ages and the two sexes were combined, were too low to warrant the substitution of one scale for the other. The coefficient of correlation between the IQ's of the one hundred six monoglots on the two scales was .62 with a PE*r* of .04 and the coefficient of correlation between the IQ's of the one hundred six bilinguists on the two scales was .61 with a PE*r* of .04.

12) The coefficients of correlation between the IQ's achieved by each language group on the *Stanford-Binet Scale* and on the *Atkins Test* are highly reliable, since these correlation coefficients are more than fifteen times their respective probable errors. It may be concluded, therefore, that the two scales are measuring the same functions to a large extent, but not to the extent where one scale may be substituted for the other in measuring the intelligence of preschool children.

13) The performance of the monolingual boys on the *Stanford-Binet Scale* surpassed their performance on the *Atkins Test.* The critical ratio of 6.28 indicated that the difference between the mean IQ's achieved on the two scales was significant.

14) The performance of the monolingual girls on the *Stanford-Binet Scale* surpassed their performance on the *Atkins Test.* The critical ratio of 6.83 indicated that the difference between the mean IQ's achieved on these two scales was significant.

15) The performance of the bilingual boys on the *Atkins Test* surpassed their performance on the *Stanford-Binet Scale.* The critical ratio of 4.75 indicated that the difference between the mean IQ's achieved on these two sales was significant.

16) The performance of the bilingual girls on the *Atkins Test* surpassed their performance on the *Stanford-Binet Scale.* The critical ratio of 3.03 indicated that a significant difference existed between the mean IQ's achieved by this group on the two scales.

17) The performance of the one hundred six monoglots on the *Stanford-Binet Scale* surpassed their performance on the *Atkins Test.* The critical ratio of 9.28 indicated that the difference between the mean IQ's achieved on the two scales was significant.

18) The performance of the one hundred six bilinguists on the *Atkins Test* surpassed their performance on the *Stanford-Binet Scale.* The critical ratio of 5.54 indicated that a significant difference existed between the mean IQ's achieved on the two scales by this group.

SUMMARY OF CONCLUSIONS

The conclusions which were reached as a result of this investigation may be summarized as follows:

1) There were significant differences between the mean IQ's achieved by the monolingual and bilingual subjects on the *Stanford-Binet Scale.* These differences were consistently in favor of the monoglots when divided according to age and sex and also when the age groups and sexes were combined.

2) Conversely, when the differences in the mean IQ's were determined for both language groups on the *Atkins Test,* significant differences in favor of the bilingual group, were found. These differences were consistently in favor of the bilinguists when the groups were divided according to age and sex and also when the age groups and sexes were combined.

3) These data were substantiated by the differences which were found between the mean mental ages achieved by the two language groups on the *Stanford-Binet Scale* and on the *Atkins*

Test. In every age and sex division, the mental ages of the monoglots surpassed those of the bilinguists on the *Stanford-Binet Scale,* while on the *Atkins Test,* the performance of the bilinguists was consistently superior to that of the monoglots. While the ratios of the obtained differences in mean mental ages to the standard errors of the differences were smaller than the critical ratios which were obtained when the mean IQ's of the two language groups were compared, the drop in critical ratio might readily be explained by the fact that the mental age units on an intelligence scale are not of uniform magnitude. Therefore, the matching of the two language groups with respect to age, within intervals of six months, may have lowered the critical ratios in mental age comparisons.

4) Since the monolingual and the bilingual subjects of the investigation were closely matched as to number, sex, socio-economic status, and age within six months' intervals, and since the performance of the bilingual subjects was significantly inferior to that of the monolingual subjects on the *Stanford-Binet Scale,* but significantly superior to the performance of the monolingual subjects on the *Atkins Test,* it may be concluded that the bilingual subjects of this investigation suffered from a language handicap in their performance on the *Stanford-Binet Scale.*

5) The coefficients of correlation which were found between the mean IQ's of the two language groups on the *Stanford-Binet Scale* and on the *Atkins Test* were too low to warrant the substitution of one scale for the other in clinical or educational practice. However, these coefficients of correlation were sufficiently reliable to warrant the conclusion that the two scales are measuring the same functions to a large extent.

BIBLIOGRAPHY

1) Arsenian, S., *Bilingualism and Mental Development.* Contributions to Education, No. 712. New York: Bureau of Publications, Teachers College, Columbia University, 1937. 164 pp.

2) ———, "Bilingualism in the Postwar World," *Psychological Bulletin,* 42: 65–86, 1945.

3) Atkins, R. E., *The Measurement of the Intelligence of Young Chil-*

dren by an Object-Fitting Test. Minneapolis: The University of Minnesota Press, 1931. 89 pp.

4) Barke, E. M., "A Study of the Comparative Intelligence of the Children in Certain Bilingual and Monoglot Schools in South Wales," *British Journal of Educational Psychology.* 3: 237–250, 1933.

5) Bere, M., *A Comparative Study of the Mental Capacity of Children of Foreign Parentage.* Contributions to Education No. 154. New York: Bureau of Publications, Teachers College, Columbia University, 1924. 105 pp.

6) *LeBilinguisme et l'Education.* Travaux de la Conference Internationale tenue a Luxembourg, 1928. Genève: Bureau International d'Education, 1929. 182 pp.

7) Callard, J. A., "Bilingualism and the Preschool Child," *World Federation of Education Proceedings,* Dublin: The Conference Reception Committee, 1933, pp. 56–58.

8) Colvin, S. S., and R. D. Allen, "Mental Tests and Linguistic Ability," *Journal of Educational Psychology,* 14: 1–20, 1923.

9) Darsie, M. L., "The Mental Capacity of American Born Japanese Children," *Comparative Psychology Monograph,* 3: 1–18, 1926.

10) Davies, M., and H. G. Hughes, "An Investigation into the Comparative Intelligence and Attainments of Jewish and Non-Jewish School Children," *British Journal of Psychology,* 18: 134–146, 1927.

11) Feingold, G. A., "Intelligence of the First Generation of Immigrant Groups," *Journal of Educational Psychology,* 15: 65–82, 1924.

12) Goodenough, F. L., "Racial Differences in the Intelligence of School Children," *Journal of Experimental Psychology,* 9: 388–397, 1926.

13) ———, "The Relation of Intelligence of Preschool Children to the Occupation of Their Fathers," *American Journal of Psychology,* 40: 284–294, 1928.

14) Graham, V. T., "The Intelligence of Italian and Jewish Children in the Habit Clinic of the Massachusetts Division of Mental Hygiene," *Journal of Abnormal and Social Psychology,* 20: 371–376, 1925.

15) Hill, H. S., "The Effects of Bilingualism on the Measured Intelligence of Elementary School Children of Italian Parentage," *Journal of Experimental Education,* 5: 75–79, 1936.

16) Hoffman, M. N. H., *The Measurement of Bilingual Background.* New York: Bureau of Publications, Teachers College, Columbia University, 1934. 74 pp.

17) Hu, P. C., "A Study of the Intelligence of Anglo-Chinese Children," *Eugenical Review,* 30: 109–116, 1938.

18) Jamieson, E., and P. Sandiford, "The Mental Capacity of Southern Ontario Indians," *Journal of Educational Psychology,* 19: 313–328, 1928.

19) Koch, H. L., and R. Simmons, "A Study of the Test Performance of American, Mexican and Negro Children," *Psychological Monographs*, 35: 1–116, 1928.

20) Lester, O. P., "Performance Tests and Foreign Children," *Journal of Educational Psychology*, 20: 303–309, 1929.

21) Mead, M., "Group Intelligence and Linguistic Disability Among Italian Children," *School and Society*, 25: 465–468, 1927.

22) Mitchell, A. J., "The Effect of Bilingualism in the Measurement of Intelligence," *Elementary School Journal*, 38: 29–37, 1937.

23) Pintner, R., "Comparison of American and Foreign Children on Intelligence Tests," *Journal of Educational Psychology*, 14: 292–295, 1923.

24) ———, "The Influence of Language Background on Intelligence Tests," *Journal of Social Psychology*, 3: 235–240, 1932.

25) ———, and S. Arsenian, "The Relation of Bilingualism to Verbal Intelligence and School Adjustment," *Journal of Educational Research*, 31: 255–263, 1937.

26) *Report of New Educational Fellowship—Sixth World Conference*, Nice, 1932. London: New Education Fellowship, 1933, 365 pp.

27) Rodriguez, A. Jr., "Are Bilingual Children Able to Think in Either Language with Equal Facility and Accuracy," *Department of Elementary School Principals*, 10: 98–101, 1931.

28) Ronjat, J., *Le Développement, du Langage observé chez un Enfant Bilingue*. Paris: Champion, 1913. 166 pp.

29) Saer, D. J., "An Inquiry into the Effect of Bilingualism upon the Intelligence of Young Children," *Journal of Experimental Pedagogy*, 6: 232–240· 266–274, 1922.

30) Saer, D. J., "Effect of Bilingualism on Intelligence," *British Journal of Psychology*, 14: 25–38, 1923.

31) Saer, D. J., F. Smith, and J. Hughes, *The Bilingual Problem*. Aberystwyth: University College of Wales Publications, 1924. 112 pp.

32) Sanchez, I., "Scores of Spanish-speaking Children on Repeated Tests," *Pedagogical Seminary and Journal of Genetic Psychology*, 40: 223–231, 1932.

33) Seidl, J. C., *The Effect of Bilingualism on the Measurement of Intelligence*, Unpublished Doctor's dissertation, Fordham University, New York, 1937. 123 pp.

34) Smith, M. E., "Bilingualism in Preschool Children," *Proceedings of the Fifth Biennial Conference*. Dublin, Ireland: World Federation of Education Proceedings, 1933. 55 pp.

35) Spoerl, D. T., "Bilinguality and Emotional Adjustment," *Journal of Abnormal and Social Psychology*, 38: 35–57, 1943.

36) Spoerl, D. T., "The Academic and Verbal Adjustment of College-

age Bilingual Students," *Journal of Genetic Psychology*, 64: 139–157, 1944.

37) Stark, W. A., "The Effect of Bilingualism on General Intelligence: An Investigation Carried Out in Certain Dublin Primary Schools," *British Journal of Educational Psychology*, 10: 78–79, 1940.

38) Terman, L. M., and M. A. Merrill, *Measuring Intelligence*. Boston: Houghton Mifflin Company, 1937. 415 pp.

39) Yoshioka, J. G., "A Study of Bilingualism," *Journal of Genetic Psychology*, 36: 473–479, 1929.

THE EFFECT OF A MEASURE OF INTEREST FACTORS ON THE PREDICTION OF PERFORMANCE IN A COLLEGE SOCIAL SCIENCES COMPREHENSIVE EXAMINATION

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While the probable usefulness of occupational interest questionnaires for the discovery of student characteristics additional to those pertaining to vocational adjustment has been endorsed by students of interests, no research on the subject appears to have been undertaken. Chauncey has proffered the hypothesis: "It may be true that occupational intention may be related directly to achievement in certain fields and related negatively to others."[1] Also, Segel and Brintle have commented: "It would seem logical to think that if interest scores based upon a criterion (such as the occupational criterion) have some relationship with academic success that interest scores obtained from a scale made directly for a criterion (such as success in an academic subject) will have a greater relationship."[2]

If investigators have found that scores obtained from measures intended to fulfill other purposes bear some relationship to academic performance, then much better predictions of academic performance should be obtained from items directly related to the criterion it is desired to predict. The validity of such a test should be dependent upon the validity of the criterion score and upon the pertinence of the list of interest items available for analysis. The method of item analysis by comparison with an outside criterion is not a new concept in test construction. Its application, however, to items of an occupational test, with the outside criterion not an index of occupational identification of any kind, but rather an index of success in a single subject-matter field is believed to be new.

[1] M. R. Chauncey, *The Educational and Occupational Preferences of College Seniors*, p. 65. New York: Bureau of Publications, Teachers College, Columbia University, 1932.

[2] David Segel and S. L. Brintle, "The Relation of Occupational Interest Scores as Measured by the Strong Interest Blank to Achievement Test Results and College Marks in Certain College Subject Groups," *Journal of Educational Research*, XXVII, (February, 1934), 442–52.

It will be demonstrated here that the seven hundred eighty interest or activities items in the Kuder *Preference Record*[1] may be used for another purpose than occupational analysis, the description of a special pattern of interests which is related to performance in a social sciences comprehensive examination taken by two hundred forty-seven students at the University of Chicago.

In establishing this pattern there was obtained for each of the seven hundred eighty items of the complete *Preference Record* the percentage of use of the item by each of the following three groups: (1) those students who made A or B on the comprehensive; (2) those who made C; and (3) those who made D or F. By this procedure, those items were located which showed statistically significant discriminations in the percentage of use among the letter-grade groups at the five per cent level of significance.

One hundred and nine items were thus isolated from the total of seven hundred eighty items. A new scoring pattern for the test was made, which keyed these items as 'right' in view of their more frequent use by the AB group. All papers were re-scored in terms of this new pattern. To distinguish it from the eight occupational scales, it will, for the purposes of this report, be called the Social Sciences Interests Index. The following example will illustrate the procedure used:

On Item H, page 2 of the *Preference Record*, the tabulation of the preferences of the AB's, C's and DF's yielded these results:

	AB	C	DF
(a) Study law with a view to entering politics	76%	65%	47%
(b) Study law with a view to becoming a criminal lawyer	24%	35%	53%

An examination of the tabulation for this item indicates superficially at least a tendency for students with higher grades to prefer the (a) choice. The difference of twenty-nine per cent between the AB and DF groups is statistically significant as is also the difference of eighteen per cent between the C and DF

[1] G. Frederic Kuder, *Activity-Preference Record.* Chicago: Science Research Associates, 1939.

groups. The difference of eleven per cent between the AB and C groups is not significant. As the plan in building the new index provided for the inclusion of any item that would increase its correlation with the criterion scores—the comprehensive examination grade—this item was retained for the scale. Each pair of the seven hundred eighty activities was similarly examined and, when it fulfilled the criteria, was included in the new interest scale in terms of the AB preference. When the answer sheets were re-scored in terms of the new interests pattern, one point was allowed for each preference in agreement with the AB-group response. The scores thus obtained for the two hundred forty-seven papers, when correlated with the scores on the comprehensive examination in the social sciences, produced a coefficient of .60. In a second correlation which included three hundred fifty-three papers (one hundred six additional to the original two hundred forty-seven cases) the obtained coefficient was .57. In a third analysis which included only the one hundred six cases, the obtained coefficient was .55.

Because the method of item analysis frequently accentuates chance factors, one of the least acceptable proofs of validity of a test constructed by the method adopted in this study is its success with the group upon which the item analysis is based. The coefficient of validity of .55 obtained for the group of one hundred six students not included in the original item analysis was taken to be one indication of validity in a second group. One of the most desirable checks on the validity of the new test would have been its application with additional groups of entrants at the University of Chicago. How much validity the interests test has for use in colleges other than the University of Chicago is unknown. Conditions may so vary from college to college that the same pattern of interests would not be useful unless the conditions operating for the two student bodies being compared were shown to be quite similar.

The addition to a battery of tests of one which gives as good predictions for the criterion as the interest test is not especially desirable if there are other tests available that give such predictions. However, if it can be shown that a prediction which may not be superior, or may even be inferior, to those obtained with other predictors results from the measurement of some factors that have not been measured in the other tests, then the

measure assumes special importance. The best single predictor for the group of two hundred forty-seven students of this study was the Social Sciences Placement Test, constructed by the Board of Examinations of the University of Chicago; it yielded a coefficient of .65 with the grade in the comprehensive examination. The total score of the American Council Psychological Examination yielded .57. The intercorrelation between the Social Sciences Placement Test score and the psychological examination score was .61. It may be noted from Table 1 that when that portion of the overlap between the comprehensive examination and the Social Sciences Interest Test which is also included in the correlation between the total score on the psychological and the comprehensive tests was held constant, the coefficient of .60 was reduced by only .04.

TABLE 1.—INTERCORRELATIONS OF ZERO, FIRST, AND SECOND ORDERS AMONG THE SOCIAL SCIENCES INTEREST INDEX, THE COMPREHENSIVE EXAMINATION, AND THE APTITUDE EXAMINATIONS

Zero-order Coefficients		First-order Coefficients		Second-order Coefficients	
X's*	*r*	*X*'s*	*r*	*X*'s*	*r*
12	.60	12.3	.56	12.36	.51
13	.33	12.4	.56	12.46	.54
14	.25	12.5	.54	12.56	.52
15	.30	12.6	.53		
16	.33				

* Variables: X_1 Interest Test in the Social Sciences
X_2 Comprehensive Examination in the Social Sciences
X_3 American Council Psychological Examination-Total
X_4 American Council Psychological Examination-Quantitative Score
X_5 American Council Psychological Examination-Linguistics Score
X_6 Social Sciences Placement Test prepared by the Board of Examinations of the University of Chicago

Similarly, ruling out the factors measured in the Social Sciences Placement Test, the coefficient was reduced .07, to .53. The interest measure did not, therefore, duplicate the placement test to any significant degree. Finally, partialling out both the psychological examination and the placement test simultaneously, rather than separately, the $r_{12.36}$ of .51 indicated a very substantial measurement by the interest test of factors in the comprehensive examination which were not measured by the other two tests.

In addition to the consideration of that aspect of uniqueness which dealt with non-overlapping with other measures, there was also the problem of determining whether the pattern of interests was valid only for prediction in the social sciences. Although the new measure had been entitled 'interest in the social sciences,' the judgment of its psychological content was more hypothetical than proved. The questions arose: What was the psychological content of the new instrument—did it represent a special pattern for the social sciences, or could it be used to characterize all 'successful' students? Was the new pattern generally applicable as a measure of the interests of students who did well in the social sciences? Could other tests be constructed by similar methods that would have greater usefulness for their respective fields than the social sciences tests? Although complete answers to these questions are not legitimately within the province of this paper, sufficient reply has been made to them to indicate that the content of the interest pattern found was peculiar to the social sciences.

TABLE 2.—COEFFICIENTS OF CORRELATION FOR THE INTEREST TEST IN THE SOCIAL SCIENCES AND OTHER AREAS OF THE COMPREHENSIVE EXAMINATIONS

Comprehensive	*r*	PE	*N*
Biological sciences	.50	.04	143
Physical sciences	.42	.04	209
Humanities	.31	.04	205
English	.30	.04	206
Social sciences	.60	.03	206

The first step taken in the analysis of content was the application of the test in other areas. As was done in the case of the

scores on the Social Sciences Comprehensive Examination, correlations were obtained for the relationship of the interest-test score to the scores for the biological sciences, physical sciences, humanities, and English qualifying comprehensive examinations. These coefficients are reported in Table 2.

While there is a substantial relationship shown for biological sciences (.50) and for physical sciences (.42), these relationships were considerably less than in the case of the coefficient for the social sciences (.60). That this variation probably arises from real differences intrinsic in the content of the test, rather than from a merely statistical difference stemming from the method of construction, has already been indicated by interpretations based on Table 1.

THE FINAL REGRESSION EQUATION

The equation finally chosen for the best prediction of the criterion score, the grade in the Social Sciences Comprehensive Examination, was, therefore, the one based upon the combination of the psychological examination total score, the social sciences placement test score, and the interest-test score, expressed as $R_{1(236)}$. In the regression equation,

$$X_1 = .21X_2 + .44X_3 + .14X_4 - K1.9,$$

the standard error of estimate was 2.6. All the variables except the interest test are expressed in the equation in terms of derived score points (the interest test is expressed in raw score points). The data obtained in the development of the regression equation follow.

Primary Data:

	Variable	Mean	SD
(1)	Social sciences comprehensive	20.3	4.2
(2)	Psychological test—total	20.5	4.0
(3)	Placement test in social sciences	20.4	3.8
(4)	Interest test in social sciences	61.4	11.7

Zero-order Coefficients:

r_{12}	.57	r_{23}	.61	r_{24}	.33
r_{13}	.65	r_{14}	.60	r_{34}	.33

Partial Coefficients of the First Order:

$r_{12.3}$	.29	$r_{13.2}$	.47
$r_{14.3}$	.53	$r_{14.2}$	.53
$r_{24.3}$	.17	$r_{34.2}$	.18

Partial Coefficients of the Second Order:

$r_{12.34}$ .24
$r_{13.24}$ .45
$r_{14.23}$ .51

Standard Errors of Estimate:

$\sigma_{1.234}$ 2.6
$\sigma_{2.134}$ 3.0
$\sigma_{3.124}$ 2.7
$\sigma_{4.123}$ 9.4

Partial Regression Coefficients:

$b_{12.34}$ .21
$b_{13.24}$ .44
$b_{14.23}$ .14

Constant:

$K = -1.9$

Regression Equation

$X_1 = .21X_2 + .44X_3 + .14X_4 - 1.9$

Standard Error of Estimate of the Regression Equation:

$\sigma_{(est.)} = 2.6$

Probable Error of Estimate of the Regression Equation:

$\text{P.E.}_{(est.)} = 1.8$

The correlation of actual scores obtained in the comprehensive examination with scores obtained by prediction based upon the regression equation equaled .78 for the sample used. For an additional group of eighty-five cases not included in the original sample, on which the interests index was validated, the final regression equation was .74.

Using the regression equation given above for actual prediction, the grades on the Social Sciences Comprehensive Examination could have been predicted exactly for forty-nine per cent of students, and within one letter grade for another forty-four per cent.

There is in these data important evidence for the counselor, for it is indicated that student performance is a combination of more than ability and past performance in a field of study. It is also indicated that these additional factors are not as intangible from the standpoint of measurement, as they have sometimes been considered. This investigator believes that interest patterns could be developed which can serve as well in the prediction of performance in other subject-matter areas as in the social sciences.

SCHOLARSHIP OF WORLD WAR I VETERANS WHO STUDIED AT THE UNIVERSITY OF COLORADO FROM 1919 TO 1926

ELIZABETH D. S. STEWART AND ROBERT A. DAVIS
University of Colorado

The purpose of this study was to determine whether veterans of World War I, who studied at the University of Colorado under the auspices of the Federal Bureau for Vocational Rehabilitation,[1] from 1919 to 1926, were as proficient students as were the average men students enrolled in the University during the same period of time.

The first step in the procedure was to select from the records of the University a fairly large number of names of men students whose records bore clear evidence that they had been enrolled in the University under the auspices of the Federal Bureau for Vocational Rehabilitation.

It was not possible, at this late date, to determine just how many men were enrolled in the University under these auspices because no formal permanent segregation of the names of such veterans had been made, other than to designate those men enrolled in the Vocational Engineering courses.[2]

The men enrolled in Vocational Engineering courses were not considered in this study for the reason that those courses were not of college grade in content or scholastic requirements. Men enrolled in them were not considered bona fide University students, since the courses did not lead to a university degree.

Determination that the names selected were those of men registered under the auspices of the Federal Bureau for Vocational Rehabilitation was made by means of: incidental entries on the permanent record cards of the University; correspondence in the departmental files for those years; lists of veterans which had been compiled at various times for one reason or another, and which did not include all the veterans; news items in issues of the campus newspaper, and the University year book, for the years 1919 to 1926; and by similar means and devices.

The sample thus selected consisted of the names of two hun-

[1] *U. S. Statutes at Large*, v. 40, p. 617. 1918.
[2] *Biennial Report of the Regents of the University of Colorado*, 1920.

dred and fifty-one men who were enrolled in the University as candidates for degrees, between the years 1919 and 1926.

The second step in the procedure was to select a comparable sample of non-veteran men students from the same University records. This was done by stratifying the samples in each school or college within the University according to the number of quarters the students were enrolled. For example, if five veterans were enrolled in the School of Law for a total of seven quarters each, five non-veteran men students were selected at random, from the records of the School of Law, who had also been enrolled a total of seven quarters each, during the same period of time (1919 to 1926). This procedure was repeated, with the groups enrolled in each of the various departments of the University, until a total sample of non-veteran men students approximately as large as that of the veterans was assembled.

Since the systems of grading varied with the different departments of the University, and were also modified during the period covered by the study, they were equated according to the following methods:

1) All grades from 0 to 50, as well as 'NP', were given the numerical value of 50.

2) The grades 'Pass', 'NCD', and 'CR' were disregarded.

3) All grades of 'incl.', 'Cond.', and numerical values from sixty to sixty-nine (which were considered 'conditions') were given the numerical value of 60.

4) Letter grades were assigned the following numerical values:

A 95	B 85	C 75	F 50

5) All fractional grades were given the value of the next higher whole number. For example 78.50 was changed to 79.

The third step was to compute the mean of each student's grades, using the grade value given for each course. Then the mean of all the individual means, in each group of veterans, and each group of non-veterans, in each school or college within the University, was computed. The standard deviation of each distribution was then determined, and the standard error of the difference between the means of the veteran and non-veteran groups in each school or college was computed.

TABLE I.—COMPARISON OF GRADES OF VETERAN AND NON-VETERAN MEN STUDENTS ENROLLED IN THE UNIVERSITY OF COLORADO FROM 1919 TO 1926

Department in the University	No. of Cases	Grade Mean	SD of Mean	Diff. in Means	SE of Diff.	Critical Ratio
College of Engineering						
Veterans	85	78.65	8.55			
Non-veterans	88	77.62	6.16	1.03	1.05	.97
All engineering students		77.42				
School of Law						
Veterans	76	79.43	9.19			
Non-veterans	74	80.21	8.65	.78	1.45	.54
All law students		81.09				
College of Arts and Sciences						
Veterans	65	74.38	8.14			
Non-veterans	70	76.29	9.05	1.91	4.69	.41
All arts and science students		76.04				
School of Medicine						
Veterans	18	82.28	7.36			
Non-veterans	20	84.25	5.22	1.97	2.17	.91
All medical students		81.44				
College of Pharmacy						
Veterans	7	74.86	14.34			
Non-veterans	11	75.64	8.05	.78	5.43	.14
All pharmacy students		78.44				
Total veteran men students	251	77.9	8.9			
Total sample non-veteran men students	263	78.7	7.4	.80	11.61	.07

The arithmetical mean was computed of all grades given each student, and these figures were used as the basic units in all further computations. In making the distributions for each group, the following technique was used: if a student's average

was an odd number, and the first digit to the right of the decimal was five, or more, the average was raised to the next higher number, which would be an even number. For example, 89.5 would be recorded in the distribution as 90. If a student's average grade were an even number, and the first digit to the right of the decimal was just five, no change was made. But if the first digit to the right of the decimal was more than five, or if there was a second digit to the right of the decimal, indicating that the grade was more than .50 higher than the whole number value given, the whole number was arranged in the distribution as though it were the next higher number. For example, 86.50 was not changed, but 86.51 was arranged in the distribution as 87.

The method of presenting the results of this study consisted in comparing the academic achievement of veterans and non-veterans enrolled in the several schools and colleges within the University.

The results are summarized in Table I as follows:

1) In the College of Engineering, the veteran students make somewhat better grades, on the average, than do non-veteran students. The average of the veteran students is higher than that of all engineering students at the time.

2) In the School of Law, the sample of non-veteran students make better grades, on the average, than do veteran students. The average of the veteran students is lower than that of all law students enrolled during the same period.

3) In the College of Arts and Sciences, the sample of non-veteran students make better grades, on the average, than veteran students. The average of the veteran students is lower than that of all students in Arts and Sciences enrolled during the same period.

4) In the School of Medicine, the sample of non-veteran students make better grades, on the average, than veteran students. The average of the veteran students, however, is higher than that of all medical students enrolled during the same period.

5) In the School of Pharmacy, the non-veteran group shows a higher grade average than the veteran group. The mean of the veteran group is lower than that of the total number of pharmacy students enrolled at the time.

In each and all of these comparisons between sample groups of veteran and non-veteran students, in the several departments

within the University, the differences between the means of the grades of the groups is too small to be statistically significant.

It may be assumed, therefore, that the veterans are probably as good students as those who comprised the sample selected for this study of the male contingent of the student body at the University during the same period of time. They are neither appreciably better nor poorer than the average.

BOOK REVIEWS

ALEXANDER G. WESMAN. *A Study of Transfer of Training from High-school Subjects to Intelligence.* New York: Bureau of Publications, Teachers College, Columbia University, 1945, pp. 82.

It is generally admitted that transfer of training is an important problem in educational psychology, and that transfer of training occurs. In the practical situation it is desirable to discover where transfer occurs and to what degree. The purpose of this study is to measure the extent of transfer among school subjects in the normal classroom situation and the relative contribution of individual school subjects to intellectual growth as measured by an intelligence test. Subjects were six hundred forty-three fourth- and fifth-term high-school students. Standardized I.E.R. and Coöperative tests were given in September and May to measure educational achievement and intelligence. The group difference technique and correlational analysis were employed in evaluating the data.

Analysis of course patterns revealed no superiority in transfer to intelligence of any one school subject over any of the others studied, but students who took more courses gained more in intelligence score than students who took fewer courses. These results are in agreement with earlier findings. Correlation between intelligence and achievement scores tended to decrease from initial to final testing. This, it is inferred, reflected the more complex abilities measured at the higher levels of the achievement tests. There was little relation between gains in achievement and gains in intelligence test scores indicating relatively little transfer. Analysis of course patterns is rejected as a valid technique for measurement of transfer of achievement, but the correlation technique is approved. "In general, the study fails to reveal superior transfer to intelligence for any one of the achievement areas measured, and indicates the desirability of direct training in mental processes rather than dependence on transfer from school subjects." Apparently training in one subject is equal to training in any other in transfer value.

This experiment is well designed and the data adequately analyzed. There are, however, a few questions that may be

raised. Since standardized objective tests were employed to measure students growth in the subject-matter to which they were exposed, it must be assumed that these tests are valid for this purpose. Such an assumption is unsafe. Furthermore, the conclusion that the results "tend also to point to the advisability of direct training of the desired intelligence traits" will not find general acceptance. What are the "desired intelligence traits"? Is such training to take the place of subject-matter training? To advocate direct training of mental processes to foster mental growth because the findings in the experiment are largely negative, is no solution to the problem of transfer of training, especially since the author is not clear as to what is intended by his statement.

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HENRY D. RINSLAND. *A Basic Vocabulary of Elementary School Children.* New York: The Macmillan Company, 1945, pp. 636. $6.00

The widespread interest in word-counts, despite the increased emphasis on Semantics principles, continues to find expression in extensions of old lists and the construction of new ones. The newest list, compiled by H. D. Rinsland, was derived from a count of over six million words used by children in written work inside and outside of school. Effort was put forth to obtain free writing—composition uncontrolled by teachers. The analysis included: reports of projects, original stories, poems, accounts prepared for school papers, and tests written in non-technical fields. A representative geographical distribution of pupils in grades I to VIII included boys and girls from varied types of urban and rural schools, training schools associated with universities, and public, private, and parochial schools.

More than 200,000 individual papers were examined and a list of 25,632 different words was assembled. Of the 25,632 words, the 14,571 appearing three or more times in any one grade are presented in alphabetical order. A very convenient table (comprising most of the book) lists the 14,571 words and shows their frequency in each grade. The 6,012,359 words were distributed by grades as follows:

Grade I.....	353,874	Grade V.....	835,130
Grade II.....	408,540	Grade VI....	853,409
Grade III.....	770,019	Grade VII...	910,754
Grade IV.....	792,326	Grade VIII..	1,088,343

A frequency count in the first grade of 457 (for the preposition *about*) means that this word appeared 457 times among 353,874 words; in grade VIII its frequency, 4330, means an occurrence of 4330 among 1,088,343 words. A very helpful index symbol under each word gives further practical help by designating the frequency group (by the hundred, five hundred, and thousand) to which each word belongs. Thus it is possible to find with ease the particular grade in which each word has its greatest use.

This vocabulary, based on children's own usage, may prove superior to others for certain purposes. Although it is much less comprehensive than the Thorndike-Lorge lists, it provides a rough index to the frequency with which various words are used by boys and girls in different grades. The analysis of words beyond the third grade might be employed to check the vocabulary load of textbooks at the upper grade levels (where little careful research has thus far been reported); furthermore, students of Semantics might use this list for comparative purposes. This investigation has the same limitation of the Thorndike work; little serious attention is given to the most important single aspect of vocabulary development; namely, the use, function, and varied meanings of words.

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EDNA YOST AND LILLIAN M. GILBRETH. *Normal Lives for the Disabled.* New York: The Macmillan Co., 1944, pp. 298.

This book is written for two groups: those with a physical disability of any kind and those interested in helping the disabled to achieve useful and happy lives. It is concerned with both morale and vocational rehabilitation. Experience of the authors indicates that, with few exceptions, handicapped persons can attain economic independence and a normal social existence. Handicapped persons should make the effort as soon as possible to help themselves. Immediate and short-time problems as well as underlying and long-time problems are considered. Major sections of the book deal with problems to be faced in

making up one's mind to work, getting ready to work, on the job, and considering the future.

Although the treatment is sympathetic, it is stated in unequivocal terms that success depends upon the disabled person. A man must earn his happiness. Help of others can only make it possible for the disabled person to do something for himself. Reality must be faced. In general this is a book on mental hygiene plus much important information on vocational rehabilitation such as provisions of laws, agencies and services, artificial appliances, training, attitudes of industry, etc. Included is a comprehensive picture of what has been done and is now being done to help disabled people rehabilitate themselves.

This well-written and soundly-conceived book should be read by all handicapped persons as early as possible after the onset of disability. Also vocational counselors who deal with the handicapped will find much useful information in it.

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PUBLICATIONS RECEIVED

HAROLD H. ANDERSON AND HELEN M. BREWER. *Studies of Teachers' Classroom Personalities. I: Dominative and Socially Integrative Behavior of Kindergarten Teachers.* Stanford University, Calif., Stanford University Press, 1945, pp. 157. (paper) $2.00.

EMILY V. BAKER. *Children's Questions and Their Implications for Planning the Curriculum.* New York: Bureau of Publications, Teachers College, Columbia University, 1945, pp. 172. $2.35.

HAZEL C. BENJAMIN. *Employment Tests in Industry and Business: A Selected Annotated Bibliography.* Princeton, N. J.: Industrial Relations Section, Princeton University, 1945, pp. 46. (paper) $0.50.

WILLARD W. BLAESSER AND OTHERS. *Student Personnel Work in the Postwar College.* Washington, D. C.: American Council on Education, 1945, pp. 95. (paper)

HERMAN F. BRANDT. *The Psychology of Seeing.* New York: The Philosophical Library, 1945, pp. 240. $3.75.

G. T. BUSWELL. *Non-oral Reading: A Study of Its Use in the Chicago Public Schools.* Chicago: University of Chicago Press, pp. 56. (paper)

CHARLES B. BROWN, WESLEY M. CARR, AND MILTON L. SHANE, Editors. *A Graded Word Book of Brazilian Portugese.* New York: F. S. Crofts and Co., 1945, pp. 252. (paper)

FREDERIC D. CHEYDLEUR. *Criteria of Effective Teaching in Basic French Courses at the University of Wisconsin.* Madison, Wis.: University of Wisconsin, 1945, pp. 61. (paper)

URBAN H. FLEEGE. *Self-revelation of the Adolescent Boy.* Milwaukee: The Bruce Pub. Co., 1945, pp. 384. $3.50.

DAVID FREW. *The Scottish Council for Research in Education: Its Aims and Activities.* London: University of London Press, 1945, pp. 46. (paper) 1s.

FRED M. FOWLER. *Selection of Students for Vocational Training.* Washington, D. C.: U. S. Office of Education, 1945, pp. 156. (paper)

ARTHUR I. GATES AND MARY M. BARTLETT. *My First Seatwork Book.* New York: The Macmillan Co., 1945, pp. 81. (paper) $0.48.

FREDERICK J. GILLIS. *The Spiritual Problems of a Teacher.* Boston: City of Boston Printing Department, 1945, pp. 16. (paper)

MILTON HARRINGTON. *The Management of the Mind.* New York: Philosophical Library, 1945, pp. 200. $3.00.

ERNEST HOOTON. *Young Man, You Are Normal.* New York: G. P. Putnam's Sons, 1945, pp. 210. $2.50.

ABRAM KARDINER. *The Psychological Frontiers of Society.* New York: Columbia University Press, 1945, pp. 475. $5.00.

D. KENNEDY-FRASER. *The Terman-Merrill Intelligence Scale in Scotland.* London: University of London Press, 1945, pp. 47. (paper) 1s.

GERTRUDE GILMORE LAFORE. *Practices of Parents in Dealing with Preschool Children.* New York: Bureau of Publications, Teachers College, Columbia University, 1945, pp. 150. $2.10.

MAY LAZAR. *Guiding the Growth of Reading Interests.* New York: Board of Education, 1945, pp. 33. (paper)

ALFRED MCCLUNG LEE. *Race Riots Aren't Necessary.* New York: Public Affairs Committee, Inc., 1945, pp. 31. (paper) $0.10.

WILLIAM ELLERY LEONARD. *A Man Against Time: An Heroic Dream.* New York: D. Appleton-Century Co., 1945, pp. 79. $2.00.

BERTHOLD LOWENFELD. *Braille and Talking Reading: A Comparative Study.* New York: American Foundation for the Blind, Inc., 1945, pp. 53. (paper) $1.00.

SAMUEL LOWY. *New Directions in Psychology.* New York: Emerson Books, Inc., 1945, pp. 194. $3.00.

LOREN C. MACKINNEY, NICHOLAS B. ADAMS, AND HARRY K. RUSSELL. *A State University Surveys the Humanities.* Chapel Hill, N. C.: The University of North Carolina Press, 1945, pp. 262. $4.00.

JOSEPHINE H. MACLATCHY, Editor. *Education on the Air.* Fifteenth Yearbook of the Institute for Education by Radio. Columbus, Ohio: Ohio State University, 1944, pp. 300.

PHILIP MURRAY AND R. J. THOMAS. *Living Costs in World War II:* 1941–1944. Washington, D. C.: Congress on Industrial Organizations, 1944, pp. 161 #76. (paper) $0.50.

C. A. OAKLEY. *Men at Work.* London: University of London Press, 1945, pp. 301. 8s, 6d.

THEODOR REIK. *Psychology of Sex Relations.* New York: Farrar and Rinehart, Inc., 1945, pp. 243. $3.00.

GEORGE E. SCHLESSER. *A Workbook in Child Development.* Philadelphia: W. B. Saunders Co., 1945, pp. 98. (loose-leaf, unbound) Also *Teachers' Guide.* pp. 41. (paper)

HARRY P. SMITH. *A New Cardinal Objective of American Education.* Syracuse N. Y.: Syracuse University, 1945, pp. 28. (paper) $0.50.

WESLEY W. STOUT. *A War Job "Thought Impossible."* Detroit: Chrysler Corporation, 1945, pp. 51.

FRANCES O. TRIGGS. *Personnel Work in Schools of Nursing.* Philadelphia: W. B. Saunders Co., 1945, pp. 237. $2.75.

IRENE WIGHTWICK. *Vocational Interest Patterns.* New York: Bureau of Publications, Teachers College, Columbia University, 1945, pp. 231. $2.60.

EUNICE WOLFE. *A Handbook for the High-school Teacher-librarian.* Emporia, Kans.: Kansas State Teachers College, 1945, pp. 31. (paper)

BEN D. WOOD, Director. 1945 *Achievement Testing Program in Independent Schools and Supplementary Studies.* New York: Educational Records Bureau, 1945, pp. 68. (paper)